ABSTRACTS

Med-e-Tel 2015

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Telenursing
Integrated Care and IT Solutions as a Tool for Continuity of Care and Patient Safety
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Introduction: Integrated care is essential to ensuring optimal outcomes are achieved for EU citizens and especially those burdened with chronic disease and complex care needs and who require attention from a range of professionals from primary and secondary health and social care sectors. eHealth is a key enabler for Integrated Care, used here to refer to the management and delivery of health services so that citizens receive a continuum of preventive and curative services, according to their needs over time and across different levels of the health system.

Purpose & Methods: The purpose of this presentation is to report on the work of the Integrated Care work stream, as part of the Thematic Network ENS4Care. This work builds on the results of an EU wide survey undertaken using a semi-structured questionnaire and administered online. Responses to closed questions were analyzed using descriptive statistics. Analysis of responses to open questions followed a content analysis approach.

Results: Analysis of the evidence collected, and the extrapolation of the key elements of the practice examples amassed, pointed towards a four-stage deployment pathway consisting of planning, implementation, evaluation and elaboration processes influenced by cross-cutting structural and procedural factors. This presentation outlines the key steps and considerations for the design and delivery of eHealth services for Integrated Care at different levels of deployment.

Conclusions: The guideline deployment pathway that is detailed here is targeted at a range of stakeholders with an interest in eHealth services and is designed to be transferable across EU countries. It is of interest to policy-makers, health professionals, citizens, patients and industry who have a role in the design or deployment of eHealth services for Integrated Care at local, regional, national and EU level.

Keywords: nursing, continuity of care, IT

Blood Glucose Level Prediction for Mobile Lifestyle Counseling
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Diabetes mellitus is one of the modern age diseases, spreading widely and causing critical problems in health care.
Our aim is to help diabetics calculate their insulin need by predicting short term blood glucose courses with an efficient algorithm, to be integrated in the mobile lifestyle mirror application Lavinia.
We propose a combination of two state-of-the-art models, one for absorption and one for blood glucose control, which can support both Type 1 and Type 2 diabetics using subcutaneous insulin injections. Our method takes nutrition, applied insulin, and initial glucose level into account during the calculations. The first part of the combined model describes the glucose absorption from meals, while the second part estimates the blood glucose level upon the insulin absorption. The models have many parameters, which suits the high natural variability of the patients. In order to Personalise the model, i.e. to train the parameters, two parameter identification algorithms were used. The first one is the Brute Force Algorithm (BFA), which means a full search of parameters in a specific range. The advantage of this method is its completeness; the disadvantage is the long running time. The other method is the faster, but less precise Genetic Algorithm (GA). GA simulates the process of natural evolution, using the tools of genetics like mutation and crossover. A validation of the predictive power of the method has been made including several phases with and without the training methods as well. The tests were based on real life data from both type 1 and type 2 diabetics. The results show a significant improvement if a model training method such as GA and BFA is used. Specifically, during an all-day validation, the prediction error was smaller than 3 mmol/l in 83% of the cases while using GA. Compared to other methods and tests in the literature this result is very promising in predicting glycaemia. The method is currently being validated in a clinical study with 20 patients, the integration of the algorithm into the telemedical lifestyle support system is expected later this year.

**Keywords:** mobile lifestyle counseling, eHealth, diabetes

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**Know Your End-Users: Solid Organ Transplant Patients’ Use and Acceptance of Technology for Self-Management Support**


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Background: Medication adherence and leading a healthy lifestyle is crucial to guarantee good outcomes after solid organ transplantation (Tx). Interactive health technology (IHT) is increasingly used to support patients’ self-management. Yet, high quality self-management intervention studies in transplantation and chronic illness in general are scarce and their efficacy will depend largely on the patient’s preference or comfort with the adopted technology. As a first step in developing and testing an IHT-based intervention to support medication adherence, physical activity and weight control, we aimed to gain insight on transplant patients’ use and appreciation of modern technology, their attitude towards technology to support their health, and factors hindering or facilitating technology acceptance.

Methods: This mono-centric, cross-sectional, descriptive study applied few inclusion and exclusion criteria to target a typical representative sample of Tx patients. A questionnaire was iteratively developed based on the ‘Unified Theory of Acceptance and Use of Technology’ and pilot tested. It was completed during an interview with a consecutive sample of 122 adult heart, kidney, liver and lung Tx patients (age, 56±13 years; 57% men) over a 10-week period (participation rate= 88%; 122/139).
Results: The majority of patients had at least one laptop or desktop PC (89%) and access to internet (93%; n = 113), of which 90 patients (80%) had wireless internet. Less than one third used smartphones, making this a less suitable platform to deliver an intervention. Patients were willing to use a weight scale (84%) and a pedometer (51%), but were less eager to use an electronic pillbox (37%). Automated wireless transfer of data was preferred, as well as receiving feedback via visual charts, rather than via SMS. On a Likert-scale from 0–10 on the expected importance of IHT as a support tool for self-management, the median score of patients was 7 (IQR 5–8), indicating a positive attitude.

Conclusions: Most Tx patients were open to IHT for self-management support and have a computer and wireless internet, providing a critical first basis to start designing our IHT intervention.

**Keywords:** transplantation, self-management, technology acceptance

Design and Implementation of an Expert System for the Diagnosis of Ebola Disease in Africa
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Ebola disease incidents have been on the increase in our society and are becoming increasingly difficult for doctors to give the right diagnosis. The main objective is to develop an automated mechanism for EVD based on laboratory test result and subsequently recommend the right prescription for the treatment. This expert system is expected to aid physicians in making intelligent decisions on lives. The methodology applied is structured system analysis and design methodology (SSADM). It is expected that the software should be able to capture patients’ records, store them, diagnose a patient of a specific blood disease from test result and store the records for future reference.

**Keywords:** expert, system, automated, pilot, decision

Realizing the Potential of Information Communication Technology (ICT) to Support People Challenged Their Health
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This presentation will showcase the achievements of ENS4Care (www.ens4care.eu), a project funded by the EU for 2 years from December 2013 to engage social and health care practitioners in collaboratively addressing challenges arising from the ageing population and accompanying increase in the numbers of people living with long-term conditions and non-communicable and chronic disease in many parts of Europe.
The International Federation of Social Workers (IFSW) is one of 24 European partners in the project which includes representatives from civil society, academia, social and health care professionals, researchers, regulators, trade unions and industry, led by the European Federation of Nurses (EFN), working together to develop evidence based guidelines for eHealth social and nursing care services. Guidance produced by the project focuses on healthy lifestyles and prevention, early intervention and integrated care and highlights the need for skills development for advanced roles such as those concerned with the protection of children and vulnerable adults, social and nurse prescribing and the urgent need to replace institutional service models with those that prevent illness and disability occurring and promote self-directed care and interdependence, realizing the benefits of telecare, eHealth and other technological developments.

The eHealth guidance that is being developed by the ENS4Care project will put up to date information at the fingertips of service users, carers and those professionals supporting them about the merits of different treatment options and the availability of specialized equipment that may enhance their well-being and keep them safe, enabling them retain or regain control over the services they are receiving and live as independently as possible.

**Keywords:** e-health, ICT, health care

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**CLICT - A Scheme about the Completeness of Layers towards Integrated Care Enabled By Technologies**

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We explore the relations between Integrated Care and Technologies, in the joint evolution of organizational models and technological deployments towards Horizon 2020: a citizen is a holistic whole, but care and cure are fragmented; integrated care and thus integrated information are required. The innovation of care and cure services, enabled by telemedicine and eHealth solutions, is mostly following a number of silos, to pursue the final goal of Integrated Care. Each silo involves a commitment by policy-makers, the deployment of organizational changes, and the implementation of specific technological components. Those silos should be harmonized into a comprehensive framework, within a Roadmap towards Integrated Care. However stakeholders and decision makers belong to various communities of practice, namely with strategic, clinical, organizational, educational and technological competences, different languages and perspectives, specific objectives and priorities, and thus with different roles in the introduction of the innovation. We present a scale with six layers on the systemic completeness towards Integrated Care, reflecting: the distribution of roles among the above communities of practice; the way in which the innovation is interpreted; the drivers for its deployment; the type of technology involved; the criteria to evaluate the performance and to manage the procurements in outsourcing contracts. The Technological Layers 1-2 set up an efficient substrate, e.g. broadband, master files of citizens and professionals, operational components on booking and prescribing, mostly included in the European and National Digital Agendas. In the Organizational Layers 3-4 local initiatives use clusters of technological components to support some clinical pathways, to facilitate the collaboration among the actors, the activation of the patients, and the (clinical) governance of the health system. In the Strategic Layers 5-6 Regional regulations and plans promote innovative policies based on the previous layers, to support change management and
to actually integrate multiple care settings, both vertically (hospital and primary care) and horizontally (social and health care).

**Keywords:** Integrated Care, innovation, regional strategies, organizational models, digital agenda
e-Triage Bracelet
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The terrorist attacks on 22 July 2011 in Norway has focused on projects which can increase the safety of citizens in such situations. The goal of the EU-project BRIDGE is to increase the safety of citizens by developing technical and organizational solutions that significantly improve crisis and emergency management. The Project has developed several concepts which shortly will be presented, but the presentation will concentrate on the E-triage system. A situation characterized as a disaster is a disparity between needs and available resources, both qualitatively and quantitatively. Medically this leads to increased mortality compared to a “normal civil situation”. Today’s way of handling an emergency is characterized by little availability of customized ICT-solutions and as a consequence lack of use in comparison with society in general. Use of modern ICT should be used to replace and or support manual processes in order to reduce workload, enhance situational awareness and increase treatment handling and capacity, improve the quality of data-gathering and processing, individual monitoring and treatment. With continuous monitoring E-triage contributes to better prioritization of the right patients for treatment and transportation - and thus contribute to better outcome (i.e.; reduced mortality) E-triage contributes to that goal. According to the situation, the right patient receives the right treatment at the right time and is transported to the right destination at the right time“. Our E-triage concept’s goal is to offer the easiest monitoring system as possible + ID-system and info on a patient’s location. The E-triage bracelet is easy to put on, easy to operate, allows wireless continuous transmission of data to the EMCC, medical commander on scene and the receiving hospital. Recorded, transmitted and stored information: The victim’s identity, GPS, tracking function Manual and auto –triage – LED lights Alarm functions. Movement sensor correlated to the patients GCS Skin TP. In future versions Pulse-detector and blood pressure will be included.

Keywords: E-triage bracelet better medical outcome
This project aims to facilitate immediate prehospital assessment of remote and rural patients using remotely supported ultrasound (US) and a novel communications device. Ambulance paramedics and BASICS personnel can function as remotely supported ultrasound operators who are guided and advised by hospital-based specialists regarding diagnosis and treatment options. Novel communication technology can link these users in areas with low communications coverage by connecting to multiple cellular 2G/3G/4G networks and/or satellites to stream live US and video images, plus two-way audio.

The system is initially being tested with Focused Assessment with Sonography in Trauma (FAST) and transcranial scanning to detect midline (third ventricle) shift for stroke, although ultrasound can be a useful tool in a variety of other emergency and routine situations, offering wider applicability. An ambulance-based demonstrator system was used to capture thoracic and head US images from 10 healthy volunteers at 16 locations across the Scottish Highlands. Volunteers underwent brief training to perform the scans, and received expert guidance via the communications link. The US images were streamed, with a video feed of the simulated patient and voice data, to reviewers based in Inverness for image interpretation and diagnosis. Two scanning sessions were transmitted via satellite and 21 over cellular networks. The expert reviewers rated the communication and image quality and how helpful it was in reaching a diagnosis. Connections to remote reviewers with live US and audio-visual transmission were successful in 15 of the 16 sites trialed; the single failure was due to poor network coverage. Appropriate views were provided in >95% scans and communication was considered adequate for remote diagnosis in >90% of cases. The mean upload rate was 835 kbps and mean latency was 114 ms on cellular networks. This prehospital support US system could facilitate early diagnosis and the streamlining of treatment pathways for remote and emergency patients. It could be particularly applicable and useful in rural areas worldwide with poor communications infrastructure and extensive transport times.

**Keywords:** prehospital, imaging, transmission, teleguidance, remote

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**Can IT Improve Healthcare? Improve Patient Safety and Quality of Emergency Vehicle Transportation with Telemedicine**

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In our project we use ambulance-to-hospital based telemedicine, with built in voice-communication systems and high-definition digital cameras in the ambulance. Remote patient monitoring and vitals data (e.g., blood pressure, ECG, pulse, O₂ saturation) is sent to hospital physicians who are supervising the transport. The direct live transmission of voice and video informs and advises the paramedic at the scene, aiding remote and preliminary diagnosis and triage decisions, and also informs the emergency room to which the patient is transported. We are ‘virtually on board’ and supervise the critically ill patient from the hospital. Remote observation in the ambulance allows the emergency room to be informed about the clinical status of the patient, and determine if a surgeon, anesthesiologist, or cardiologist should be present or prepare the OR, intensive care unit etc.

In the future patients will have to be transported over greater distances due to concentration of care in the Netherlands. This includes primary (emergency) and secondary (planned) transports. With this telemedicine system the patient will be safer and it will save lives. Worldwide developments in
Healthcare: e.g., aging population, increasing chronic diseases, require new care delivery models. Use of Big Data and data mining will become more important, allowing doctors to see which treatments are most effective for particular conditions. Cloud solutions, mobility will become key items.

The pilot, now in the preparation phase and seeking funding, will be conducted with hospitals in Weert, Venlo, and Roermond. The goal is to improve patient safety; sparing every minute that can possibly save lives; e.g., decreasing medical risks in early assessment of strokes during critical moments can save lives and minimise after effects. We optimize patient records transfer. Challenges are numbers of stakeholders (hospitals, emergency services etc.), current standards of protocols, security of data transmission and post pilot funding. Opportunities are scalability national platform, extension of scope.

**Keywords:** telemedicine, emergency vehicles, transportation, patients.

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**Reliability of Semi-Automated Wound Area Measurement Using the Mobile Technology +WoundDesk**

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Aim: To evaluate the accuracy and reliability of the mobile application +WoundDesk, used for the measurement of wound surface, compared with a reference method, the digital planimetry.

Context: Evolution of the wound surface over the time is a good predictive factor for wound healing. Wound surface measurement, a part of wound treatment, should be regularly performed. Often wound surface is not measured because available methods are time consuming, or correlated with a high infection risk. A mobile phone camera is a quick, non-contact method to measure wound surface.

Design: A comparative non-randomized study.

Method: 30 wounds have been measured using the mobile application +WoundDesk by three different raters, and the results have been compared with the measures made by digital planimetry. The repeatability has been measured using the inter-rater and intra-rater reliability, the accuracy using the Pearson correlation coefficient. The standard error of measurement (SEM) was used to assess the accuracy of measurements. To fully appreciate the correlation between the 2 techniques, the graphical method of Bland and Altman was used.

Results: The intra-rater correlation was excellent with an ICC at 0.99. Inter-examiner correlation is also excellent with ICC values 0.98 (CI 0.96 - 0.98). The correlation was also excellent with a Pearson coefficient (r) 0.99 (p <0.001). Compared to the reference measurement, +WoundDesk measures realize an overestimation of 13% (IC 1-35) of the surface.

Conclusion: The mobile technology used in the application +WoundDesk is easy to use and quick. The wound surface measurements performed with the mobile application +WoundDesk are reliable, repeatable and reproducible. The accuracy is good for small irregular wounds. The limit of the method is related to the form of the wound. By large rectangular wound the accuracy decreases. Further big scales studies are needed to confirm the first conclusions.

**Keywords:** wound, mobile, nursing, homecare, assessment
Post-Surgical Continuity of Care from Home Using Skype® In a Resource Limited Country
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Introduction: Now people are getting more familiar with social media and with deeper penetration of internet social media are playing a greater role in health information exchange and decision support.

Background: Based on the encouraging outcome with post-surgical continuity of care using tele-follow up of patients undergoing thyroid and parathyroid surgery using hospital based telemedicine facility we conceptualized home based tele-follow up of such patients using one of the social media platform – Skype®.

Objective: This study was designed focused on one question - if patients undergoing thyroid surgery can be given homecare via Skype in post-operative period in a developing country scenario.

Methods: This prospective study recruited 102 post thyroidectomy patients who were offered tele-follow up using Skype®. Patients opting for tele-follow-up were examined at home through videoconference by the doctors remotely and data was exchanged in form of medical reports and doctor’s advice. Validated questionnaire (include 13 questions) for assessment of feasibility, acceptability of social media, cost & work hour saving was filled by all patients at the end of each session. Data was analyzed using SPSS version 17.

Results: Total 25 (24.5%) patients consented for tele-follow up (Group A), whereas 42 (41.18%) patients opted for regular follow up (Group B). Nine (8.82 %) patients dropped out from tele-follow up after initial consent, and 26 (25.49%) patients still lacks internet facilities. In sub-group analysis between group A and B, the mean distance was lower in group B patients (842km vs. 278 km, p value <0.001). In Group A patients, average cost and work hour saving per visit was Rs. 4340 (US$72) & 4.4 days respectively. On satisfaction scale more than 95% patients agree that social media is a feasible and acceptable tool in follow up for post thyroidectomy patients.

Conclusion: Even in resource constrained countries, social media can provide a safe and acceptable mode of healthcare delivery in post-operative period without compromising on safety of patients, however, more such studies need to be done to prove its efficacy to be adopted into health sys

Keywords: telehomecare, continuity of care

The Advanced Analytics on Medical Systems: New Generation Goals, Tasks and Problems
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The investigation and development of new medical image processing methods and systems has received great attention over the last two decades. This is due to its wide range of applications in computer-assisted methods and computer-aided methods. Among the many types of image processing, image enhancement is one of the vital processes – it is one of the preparatory steps and
it is applied before starting the image analyses. Image enhancement refers to any technique that improves or modifies digital images, so the resulting image is better suited than the original for a particular application. Essential image enhancement includes, but is not limited to, intensity and contrast manipulation, noise reduction, background removal, sharpening and filtering edges. In this context, 'image enhancement' means any method or technique which change digital images, so the resulting image is better suited than the original to a particular application. Due to this the basic types of image enhancement include manipulation of intensity, changing the local or global contrast, noise reduction, filtering and sharpening edges. During the image enhancement process one or more attributes of the image are modified. The choice of attributes and the way they are modified is specific to a given task. Moreover observer-specific factors such as the human visual system and the observer's experience will introduce a great deal of subjectivity into the choice of image enhancement methods.

This paper presents a new image enhancement method for X-ray images. The method uses HDR-image creation as a technique to increase the image dynamic range. This allows after mapping HDR-image to LDR-image (low dynamic range image) to get a better distribution of the intensity over all pixels in the image. The result is enhancing brightness, contrast and/or sharpness of images without the appearance of visible medical artefacts.

**Keywords:** medical imaging, X-rays, HDR-images
Business Model as a Strategic Tool in Telehealth Development

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Various research and pilot projects on the application and development of Telehealth have been done in Indonesia. In 2012 there were 18 pilot projects of telemedicine under coordination of Indonesia’s Ministry of Health. While in 2014, the number of hospitals used as telemedicine centers are five, and as remote hospitals are 12. Most of the applications are for Teleradiology and Telecardiology. Although the results are very promising, the application of Telehealth in Indonesia is still limited compared to the number of its population and demographic areas.

There are reasons why Telehealth has not been widely used in Indonesia. One of them is that until recently, there has been no comprehensive study on Telehealth investment that takes into account the different components that includes the business processes. This leads to investors’ hesitation in financing the Telehealth business, though the Indonesia Telehealth market is very prospective.

In order to speed up the application of Telehealth in Indonesia, this paper describes the use of business model concepts as a strategic tool in its development. By using a business model, various factors, such as costs of investment and maintenance, availability of man power and equipment, organization readiness, cost of access, regulatory, required infrastructure; can be interrelated and analyzed. Moreover, a business model facilitates coordination between the different stakeholders and facilitates communication between the provider and its users. In this research, three business model concepts are studied, viz. the Business Model Canvas, the STOF business model framework, and the VISOR framework. Components of the models are compared and mapped to suit the factors which influence development. Since Telehealth is a complex business, no single model is effective to cover the entirety of its development. Integration of the three models might be a good solution, e.g. Canvas business model is used in identifying business entities, the STOF framework is applied to derive business architecture into infrastructure, and the VISOR business model is used in the design and implementation of its application.

Keywords: business models, strategic tool, telehealth

Economic Foundation of m-Health and its Promotion in Japan

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The objective of this paper is to examine the conditions of further implementation of m-Health which is an important basis for caring patients at home.

m-Health is suitable for health management in ways other than direct treatment such as for continuous monitoring of a patient’s condition, consultation by medical specialists, disease-management, prevention of the worsening of illnesses, and guidance and education for patients. m-Health also reduces burden of family and contributes to reduce medical expenditures, which helps local governments as well as the central government which bear the cost of medicine under the current medical insurance system. Although m-Health is dispensable for the aging society, the diffusion of m-Health in Japan is not at the satisfactory level.

This paper analyzes why m-Health Japan lags behind from the viewpoint of eHealth economics, and proposes a new scheme to promote it. The current reimbursement for home care from the medical insurance is summarized as follows:

- Medical management fee for patient at home JPY 42,000 (300.00 Euro);
- Visiting treatment fee JPY1,666 (140.00 Euro);
- Consultancy and management fee for recuperation JPY 580 (4.14 Euro).

The medical treatment fee for particular diseases is also reimbursed without whether treatment is provided face-to-face or via m-Health. The issue of this current system lies in the fact that no allowances particularly related to m-Health is admitted such as transportation fees for doctors or other medical staff, depreciation fees for m-Health equipment, and telecommunications fees such as video conference.

In sum, the current reimbursement system does not provide enough incentives for promoting m-Health. Are there any alternatives to enhance m-Health? This paper proposes an incentives scheme to promote m-Health, or e-Health in general. If local government successfully reduces medical expenditures by introducing or using telemedicine, they can receive subsidies from the medical insurance depending on the amount of reduction. The paper will discuss the framework of this scheme.

**Keywords:** reimbursement, incentive, disease management, consultation

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**Economic Assessment and Key Success Factors of Nationwide Telemedicine in Slovenian Blood Transfusion Service**

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Pre-transfusion testing is required for all patients 24/7 at a point of care. The Blood Transfusion Centre of Slovenia has developed a telemedicine system which allows the remote inspection and interpretation of pre-transfusion tests from the central reference laboratory to any remote site. Telemedicine in transfusion medicine is the only nationwide telemedicine system in Slovenia. System, operating 24/7, is connecting 12 remote sites and with the same quality of service replaces the need for continues presence of transfusion medicine specialists in remote locations.
The study evaluates how a telemedicine alternative compares to the standard pre-telemedicine mode of interpreting pre-transfusion cases in terms of cost performance. The health care provider perspective is considered.

Based on the 2013 actual workload, overall yearly cost savings of telemedicine, operating regionally, is estimated to be 0.68mil€ per year. Additional 220.000€ could be realized by sharing expertise across regions.

In addition to cost savings, medical professionals feel the strongest impact of telemedicine is intra- and inter-organizational. Telemedicine has improved service delivery by streamlining the pre-transfusion testing process, bringing experienced professionals to transfusion units that were unable to recruit medical specialists and enable an immediate second opinion, which in effect could result in an improved quality of service delivery and patient outcomes. Alongside this study, a group of medical professional from The Blood Transfusion Centre of Slovenia has investigated clinical, organizational and user experience perspective of introducing telemedicine in transfusion environment. This study complements their findings with the economic perspective. Both teams have also recorded the key factors that have contributed to the success of the project. With key success factors we will conclude the presentation.

**Keywords**: telemedicine, economic assessment, pre-transfusion tests

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**Telemedicine, Solutions, Systems and Services – A Market Analysis**

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Objective: To understand the market potential for Telemedicine in India, and analyse assets, opportunities, challenges and landscape for 2020. The global Remote Healthcare Delivery (RHD) market is a $12 Bn market growing at 18.6% and is dominated by the services segment, which is expected to reach $27.3 Bn in 2016. The RHD market is segmented into tele-hospital and tele-home markets. The tele-hospital market was worth $6.9 Bn and tele-home market was valued at nearly $2.9 Bn, however the tele-home segment is growing faster than the tele-hospital segment at a projected compound annual growth rate (CAGR) of 22.5% vs. 16.8%. RHD as a market is also split into technology and service segments. The technology portion is expected to reach $11.0 Bn in 2016, with a CAGR of 19.8% and the service market is expected to grow to $16.0 Bn in 2016 at a CAGR of 18.1%. The BRICS (Brazil, Russia, India, China and South Africa) RHD market is growing at 15.8% and is mainly driven by chronic diseases such as heart failure, diabetes, asthma, and hypertension. The RHD market in BRICS has witnessed an exponential growth due to multiple factors such as Fast Technology adoption growth, increase in IT spending, and growth in telecommunication network. The market in BRICS countries is dominated by the technology segment rather than the service segment suggesting public investment, slow adoption and / or an absence of revenue models. India’s RHD market is expected to grow at a CAGR of 20% and reach $18.9Mn by 2016. However, a few estimates also expect the market to grow to $500Mn by 2016. The market is witnessing increased acceptability; however estimates vary because of the nascent stage of the industry.
The Government of India has taken several positive initiatives to develop the entire ecosystem of RHD. Until a few years ago, use of RHD in public hospitals has been driven by PPP models. A multitude of factors are coming together to create an enabling RHD ecosystem in India.

**Keywords**: telemedicine, eHealth, Remote Healthcare Delivery, market, trend, India

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**Cost-Minimisation Evaluation of the Check@flash eHealth Solution**

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Among e-Health solutions explored for supporting the elderly suffering from chronic diseases and/or multipathology, StreamVision’s Check@flash is an armchair endowed with multiple noninvasive sensors (ECG, weight, blood pressure, oximeter, spirometer, and IR temperature). It offers a complete health check-up in 7 minutes. It would be particularly useful in the context of French elderly residential care facilities (called EHPADs) to provide a valuable aid to residents’ follow-up and diagnosis.

To assess its socio-economic feasibility and viability, we have designed an in situ and in vivo non randomized trial in 7 French EHPADs. While many effectiveness studies are performed only a posteriori and focus mainly on the health system perspective, the aim of this study is to assess the cost-effectiveness of Check@flash using cost-minimisation analysis and profitability from EHPAD’s perspective.

Furthermore, we improve cost-minimisation analysis by a comparison of the utilisation costs of multiple devices (weight, blood pressure, thermometer, and oximeter) to the utilisation cost of a single integrated system (Check@flash) measured by “production minutes”. We compare Check@flash’ costs to the standard medical kit costs employed for the monitoring of EHPAD residents in 2013. We collect cost data by extracting from EHPADs’ analytical accounting and by timing the medical exams performed by nurses or caregivers using the standard medical kit. The preliminary results show that Check@flash is less expensive than the standard kit when direct costs are taken into account. The sensibility analysis results are context dependent, showing that in EHPADs where measures of blood pressure and weight are more frequent, Check@flash’ utilisation is preferable to the standard medical kit. These preliminary results will be further completed with cost-efficiency and cost-utility analyses during the experimentation, to also take into account the benefits of Check@flash solution for EHPAD’s residents (quality of life) and their family (reassurance), for EHPAD’s staff (time saving, better organization) and for the Social Security (cost optimization, better healthcare).

**Keywords**: cost-minimisation, profitability, EHPAD, medico-economic evaluation

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**Medico-Economic Evaluation Methodologies for e-Health: A Critical Appraisal**

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The gold standard for medico-economic evaluation is based on outcomes research for pharmaceuticals and medical devices. Based on randomized controlled trials, it requires the equivalence of outcomes for both active and control groups, or at least a clear unambiguous measurement of respective outcomes. This model proves to be inappropriate for the assessment of e-health projects. Several reasons justify this heterodox point of view. Major economic studies (e.g. Renewing Health) have demonstrated important rate of refusal to participate from patient, which does not guarantee homogeneity of the active group vs the control, often defined as the whole population on previous year. Active group is thus not randomized and control group neither randomized nor "controlled". Most projects include both a telemedicine dimension and a coaching dimension. Outcomes should ideally evaluate respective contributions of both the technology and the clinical components, but most often, total outcome is evaluated. When outcomes are poor, one does not know for sure which part of the process has failed. Moreover, eHealth programs are based on innovative technologies which are often obsolete when the evaluation program is completed, whereas the technology dimension is a key factor of adoption. Not surprisingly, telemedicine programs are even more "popular and efficient" that there is no or few alternatives: programs for inmates, tele stroke, tele radiology, monitoring for ESRD, .... which prevent from comparing outcomes. Some models have been developed recently, e.g. stepped wedge design, interrupted time series, multiple baseline design, etc. However, these methods also suffer from various flaws. Patient-based models (willingness/reluctance to pay) require some strong assumptions and do not always prove reliable. These issues have generated serious difficulties in the deployment and the reimbursement of telemedicine procedures. We will thus review the various existing methodologies. Then we will try to define precisely what is required in respect of evaluation results and will propose some tracks to perform cost-benefit analysis in an appropriate way.

**Keywords**: medico-economics, HTA, cost-benefit evaluations

A European Yakkasa: How Reimbursement Policies Can Adapt To New Synergies and Open Boundaries in Science

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Copay to patients are challenged in most European heath systems since the constraints imposed by existing systems limit the solutions to combinations of various existing cost sharing mechanisms, especially copays as direct charges to patients, based on percentage or rates of existing pricing of products and services. Evolution of sciences and synergies of fields of science lead to expand and open boundaries in the list of economic stakeholders, potentially concerned by pricing and reimbursement policies (especially copayment mechanisms). Europe, as Japan, is known for bargaining health care budgets between governments, as monopsony powers, and big pharma. It had led to incoherencies for subpopulations and an increase of individual strategies from doctors and their practices/clinics, pharmacists and patients to find financial solutions in complex bureaucratic and political systems.

This paper proposes to discuss how the split of pharmaceutical margins (called Yakkasa in Japan) for health care budgets can benefit from new business models proposed by mHealth and eHealth, for
more economical solutions to cover the burden of diseases between patients and their families, public and private payers and to bargain more agreeable incentive mechanisms between industry and governments. It can help to find innovative ways to adjust to retrenchments of European market shares in global healthcare markets, as well as trends towards individualization of treatment and unmet clinical needs.

**Keywords:** open boundary science, Yakkasa, Europe
**e-Health: ‘Ready’ - ‘Set’ - ‘Go’: Are We Still Stuck on ‘Ready’?**
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Variously defined, e-health readiness is about how prepared and willing individuals (public, patients, healthcare providers) and organisations (hospitals, clinics, clinician practices, residences) are to successfully introduce and sustainably integrate any ‘ICT in Health’ initiative into their life, practice, and processes.

Telehealth, one component of e-health, has been struggling to become adopted and integrated for more than 50 years, and lack of readiness is one factor. The potential influence of readiness on telehealth adoption was first researched in 1996. Although somewhat disparate, the literature now clearly shows that poor understanding of the concept of readiness, and poor understanding of the state of readiness in any given setting, will almost inevitably lead to poor implementation and poor sustainability. This paper presents the results of a structured literature search related to telehealth readiness, and summarizes definitions, theories, and tools, and discusses key lessons. The goal is to inform e-health proponents and encourage recognition of the importance of assessing and responding to telehealth readiness in the conceptualization, introduction, implementation, and sustained integration of telehealth initiatives.

**Keywords:** readiness, preparedness, telehealth, e-Health, review
a multidimensional perspective to study these determinants in healthcare settings. However, most studies have focused on physicians’ EHR acceptance measured at the individual level.

Our first objective was to assess whether organizations’ characteristics influenced physicians’ behavioral intention to use (BIU) EHR using a multilevel regression model. Secondly, we sought to identify individual and organizational factors that explain physicians’ BIU EHR.

We conducted a prospective cross-sectional study among physicians in 49 primary healthcare organizations in four regions of the province of Quebec (Canada) between April 2010 and July 2011. We first analyzed relationships between individual variables and physicians’ BIU EHR, and between organizational variables and physicians’ BIU EHR. Second, we performed multilevel modeling to explore the impact of organizational characteristics on physicians’ BIU EHR.

In total, 314 completed questionnaires were returned (response rate: 31%) and there were 31 organizations having at least 5 participants. The multilevel model found no significant overall influence of organizational level on physicians’ BIU EHR, and none of the specific organizational factors had a significant impact. Six of the individual level constructs had a positive and strongly significant impact on physicians’ BIU EHR.

This study showed that in the Quebec context, organization-level factors have no significant impact on EHR adoption by physicians. Hence, this decision is largely determined by individual factors and particular strategies are more likely to succeed if they target individual physicians rather than organizations.

**Keywords**: EHR, physicians, adoption, multilevel analysis

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**First Experiences Implementing an IHE-Based Open Source Patient Portal**

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**Introduction**: The University Hospital Heidelberg is implementing a personal electronic health record (PEHR), which provides access control, consent and content management to the patient. Thus, a patient portal is required, which is usable by patients in every age and with different technical backgrounds in order to address those aspects.

**Methods**: A requirements catalogue for product reviews was developed and success factors were defined. One of the major aspects was the consent management by the patient. Second, a market analysis was performed and different technologies e.g. LIFERAY (liferay.com) and IndivoX (indivohealth.org) were compared. Based on the results a technology product was selected. The connection to PEHR based on IHE.

**Results**: The analysis of requirements and success factors from various viewpoints (e.g. from the user perspective, data security, development, and many others) has shown that factors such as usability, expandability, backend integration and others are crucial for the success of a patient portal technology. Since LIFERAY brings various features for realizing the requirements and the success factors, it was our technology of choice for implementing the patient portal. One of the features LIFERAY offers is the use of portlets. Using portlets for e.g. the main requirement of viewing a list of documents is provided. The main goal is to develop a patient portal supporting current standards e.g.
HL7, DICOM and IHE. Based on an IHE connection to LIFERAY a Master Patient Index (MPI) can be fetched and with that MPI documents can be uploaded from Registry/Repository as well as other Services from the PEHR to the patient portal.

Discussion: As the patient portal is currently under development, practice will show if the chosen criteria have been right. The patient portal acceptance and the capability of patients managing their consents have to be evaluated.

LIFERAY fits as a solution due to its extensibility. The evaluation will be done with a group of patients affected with colorectal cancer.

**Keywords**: patient portal, PEHR, IHE, LIFERAY, OSS
Interoperability Testing of Continua-compliant RESTful eHealth Platform  
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We, at NTT Labs and Orange Labs, conducted interoperability testing of data collection on personal health record (PHR) systems based on the RESTful API of the Continua Design Guidelines (CDG). A PHR system is an eHealth platform for individuals to manage their health data. Users transmit health data to a server from various locations, such as their home or fitness club, using various sensors. Health data collected at such locations results in high-quality medical service. Interoperability between PHR systems is necessary because users use more than one PHR system or hold onto their health data throughout their lives without depending on a specific PHR system.  
Continua Health Alliance created the CDG to describe interfaces between health devices and servers. To evaluate interoperability, tests are conducted to verify the data format, or security aspects, to verify that interconnection between different systems works. For example, if application-specific security was implemented using the records in the standard message format, interconnection becomes impossible. SOAP was first adopted in the CDG between a gateway and server, defined as the wide area network (WAN) interface. Since then, a more lightweight RESTful API has been defined as a being more attractive for web applications. Moreover, implementation and understanding are straightforward.  
We, at NTT Labs and Orange Labs, have respectively deployed PHR systems in Japan and France with a RESTful API in order to conduct interoperability tests on the WAN interface. The goal was to connect a gateway (called AHD in the CDG) on a side to the PHR on the other. For the WAN interface, we covered the basic functionalities of authentication with an oAuth2 server and data collection with a resource server. The connection was done between an AHD in Japan and the servers in France. Our testing revealed that URL encoding used for the HTTP method adversely affects interconnections and should be well defined before any testing. How to use the contents of the HL7 message also affects interconnection. We also measured the response and processing times of the authentication, HL7 handling, and database registration parts.

**Keywords:** telemedicine, eHealth, Continua design guidelines, RESTfulAPI, interoperability

Return of the Introduction of a PRINCE 2 Procedure to Manage the IT Projects of the Liege University Hospital  
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We will first describe the reasons why we have started this project, and the organization behind it. We will then explain why we selected Prince 2 and how we have adapted this methodology to our needs, our size and the specificity of a university hospital. The list of the good and bad returns will then be explained. One of the good parts is the creation of the "demand document" which brought several advantages. The formalization of the demand (cost, risk, quality, expected incomes, what is NOT included in the project) is highly appreciated by the IT team but also by the users for the help it
gives in their needs description. Better understanding of the needs helps to categorize them and to focus on the important request. Project charter greatly helps also as a reminder of the initial goals and of the project borders. The methodology must be "light", and the management by exception linked to Prince 2 allow this way of working. Nevertheless, the project leader have to clearly understand that raising an exception is not a "problem". The "production document" helps to centralize all the information concerning the support and maintenance of the application after the launch. The closure of the project is also very important as it is important to switch all the information and responsibility to the production team. It is at this moment that we fix the "post project review date" which will analyses the application or the device behavior several months after the launch. It will create some very useful input to the best practice repository managed by the PMO. All this couldn't be working without the help and the control of the PMO which has created this method. The conclusion will speak about the next steps. Program management will be used using the MSP method and portfolio management will be studied.

**Keywords**: project, management, quality, methodology, organization

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**Telemedicine: Must We Be Worried About the Consequences of Cyber Attacks?**

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Objectives: Telemedicine is a set of technological factors bound to the New Techniques of the Information and the Communication (NTIC) intended to offer new tools for a remote medical practice.

Methods: Thus contain the use of the computing, the electronics, the modern means of communication among which the cordless phone, the satellite, internet connections and today the "cloud". By the fact that it uses and transmits personal medical data, she owes be in requiring most regarding safety and confidentiality.

Results: Now since a few years, and it is true more and more, the media echoed cyber-attacks whose most significant were the intrusion in the computer system of the Pentagon (USA), in the individual system of the customers of ORANGE (France) and to the intimacy of mobile phones as by the NSA and personalities' mobile phones such as the German chancellor Angela Merkel. There are other numerous examples which will be detailed during the communication

Conclusions: In such circumstances it is worth to pay more attention to the encryptions, basal security measures, complex procedures used by the secure messaging and by the companies which provide host systems to store the personal medical data.

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**Standards for Telehealth and the Emergence of the International Code of Practice for Telehealth Services**

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The International Code of Practice for Telehealth Services is the product of the Telehealth Quality Group EEIG established as a key outcome from the European Commission funded TeleSoPE project (www.telehealth.global). It inherits the mantle of the European Code of Practice for Telehealth Services that became operational in 2014 and, building on a partnership with DNV GL, boasts a growing number of accredited services.

This paper considers the wider landscape of standards and the way in which the new International Code is positioned in relation to them. It appraises, therefore, the role that standards are increasingly playing but at the same time champions approaches to standards that are not formulaic and, therefore, are better able to foster service innovation. Such an approach is argued as essential at a time when conceptions of telehealth are changing in a way that, as noted in the Commission’s eHealth Action Plan, demands greater flexibility and responsiveness to people’s needs.

Standards And Competencies for Telenursing: Are They Necessary? How Should They Be Used?
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Standards can be defined as concepts or principles established by agreement that are used as models to compare the quality or performance of a practice. Standards are designed to be used consistently, as a rule or guideline. Nursing is guided by standards of practice and standards of professional performance. Competence can be defined as a set of related skills, knowledge and abilities that enable one to act effectively in a situation. Nurses are expected to be competent in their area of practice, whether that is in a care delivery setting, e.g., ambulatory care, or a nursing specialty, e.g., informatics. Nurses are also expected to be competent for their level of practice, e.g., registered nurse or advanced practice nurse.

Many lists of competencies are available for nursing and a few are available for telenursing. Telenurses use information and communication technologies to interact with clients at a distance. Telenursing is not a specialty per se; nurses work within their scope of practice in accordance with their license.

This presentation will address two challenges for telenursing. The first challenge comes with determining standards for telenursing since their primary practice and performance standards come from their care delivery setting or nursing specialty or both. The second challenge is determining an appropriate array of competencies for telenursing, given the wide range of care delivery environments in which they work. Given that competence with the technology is necessary, other competence sets will be explored for usefulness. The challenges of optimal standards and competence sets are not unique to telenursing. Standards by specialties are becoming available. Physicians and other providers may also be looking at how to distinguish tele(specialty) providers from more traditional providers, e.g., with certification. Taking the long view, all those involved with telehealth can consider how to balance the uniqueness of telehealth with the need to remain active, productive professionals within the larger health care community.

**Keywords:** standards, competencies, telenursing, nursing
Design of Modern Mobile Devices based on Medical Information Interchange Standards

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The increasing use of mobile and individual healthcare devices is one of the major tendencies in out-of-hospital care. Many vendors provide extensive sets of those devices. Unfortunately, most of them cannot work outside their servers and service software. Transition of health data between hospitals, healthcare providers and health insurance companies is still very limited. Some of these limitations are defined by law restrictions, but many result from data format differences and general incompatibilities. The only way to solve these incompatibilities is to follow available standards and to maintain all new devices to be compatible with those standards. Common use and exchange of information between different actors in the healthcare process, in particular in clinical diagnostics process, is only possible if all partners adopt a common format, content, structure and meaning of exchanged messages. This article targets some ideas about standards implementation in the area of personal mobile healthcare devices design and implementation.

Keywords: telemedicine; medical standards; conformance; EHR

Making Advanced Telemedicine Affordable

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Telemedicine becomes increasingly important, especially in rural areas or for rare diseases requiring experts. Existing approaches offer only isolated partial solutions based on proprietary protocols. Today’s systems often incorporate only a subset of the relevant medical devices. Thus the remote physician is dependent on on-site colleagues and video-based reading of the device and medical parameters. The widespread use of proprietary protocols currently makes it virtually impossible to build flexible and cost-efficient telemedicine systems that provide data from multiple medical devices from several manufacturers. A major challenge is the possibility to remotely connect with every single medical device that is attached to the patient in a cost-efficient way. Thus we state that an open standard for medical device communication does not only enable locally interconnected medical systems but is also vital for creating comprehensive telemedicine systems.

In the OR.NET project a system based on a Service Oriented Architecture (SOA) is currently developed for local device interoperability. This will be proposed for standardization as IEEE P11073-10207, IEEE P11073-20701, and IEEE P11073-20702. This architecture is as powerful and flexible as it is needed to provide a useful, interoperable, widespread, safe, and secure telemedicine system. Based on the mentioned standard proposals we investigate the remote monitoring and control in context of telemedicine. We developed a dashboard that dynamically composes all available medical information at one place. It consolidates virtual panels of distributed medical devices, vital parameters, pictures, and video streams. The dashboard can be accessed by every common web
Due to security aspects the corresponding web server will only be accessible via a Virtual Private Network (VPN).

Our solution has several advantages. The whole system is comprised of cost-efficient off-the-shelf components. The web browser based approach requires no configuration effort and no special hardware from the remote physician, even mobile devices are possible. Physicians can access exactly the information they need for diagnostic or treatment.

**Keywords:** telemedicine, IEEE-11073, interoperability, Medical-CPS, OR-NET

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**Design and Implementation of a Hospital Database Management System (HDMS) for Medical Doctors**

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This paper aimed at designing and implementing an automated system that will alleviate the problem of handling patients data in a hospital. The inherent problem associated with the manual method is becoming unbearable hence the need for an automated method. The paper examined an existing information system of a hospital and designs of an automated system that can help Doctors and those handling hospital data. The system would be developed with a window Apache, MYSQL and PHP(WAMP) Software. The HDBMS would be a web application that runs in a computer network. It would provide easy and fast access to store data as needed by different user with security against unauthorized access. Authorized users can add, delete and update data into database based on their user-assigned role. It is expected to have a unique identity for every person and store the details of any patient and staff automatically. A user can search availability of doctors and the details of a patient using the system. The interface is very user-friendly.

**Keywords:** Automated, alleviate, software, database, user-friendly.

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**A Globally Accepted e-Health Terminology**

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e-Health is inter-jurisdictional in scope and, increasingly, in practice. The ‘jurisdictions’ are broad, from individual healthcare practitioners (community healthcare workers (CHWs) to specialists), to facility and IT managers, to policy- and decision-makers, to the general public. Central to all aspects of e-health is accurate communication, both during development and ongoing practice. But those involved may have different languages, backgrounds, cultures, and also vocabularies. This can lead to misunderstanding and misinterpretation of concepts and specific actions. Just as standards are recognized as crucial for seamless practice, clarity and consistency in use of terms is critical.
The ISFTeH’s Terminology Committee, a sub-committee of the Education Committee, has initiated a project intended to use first principles and consensus to define and/or describe key terms in order to develop a globally accepted terminology. The initial focus of the project will be on telehealth. This paper describes the planned process and next steps.

**Keywords**: terminology, taxonomy, telehealth, e-health, definitions

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**Addressing Security and Privacy through IHE Profiles**

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Security and privacy in interoperability has many dimensions. This presentation will explain how an eHealth project may more easily navigate this complex space by leveraging IHE Profiles. Each Profile is a building block of interoperability specification, which once mapped to the project requirements will be easy to specify and to combine with other widely used IHE profiles. A few example such as epSOS and several national projects will be used as examples.

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**Readiness of Telehealth Implementation in Rwanda**

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Introduction: Telehealth which is refereed as the provision of clinical and non-clinical health services at a distance has the potential to bring high quality services in rural areas. Rwanda like other developing countries still faces the challenge of shortage of health personnel in comparison with the burden of diseases. Efforts are in place to train more health personnel. More than 70% of Rwandans have health insurance coverage however the cost of transport and living expenses in case of transfers is still a burden to most patients.  
This paper will discuss the readiness to implement telehealth in Rwanda in terms of political will, ICT infrastructure, guidelines and human resource.

Methodology: Literature review and expert opinion were used to assess the readiness of Telehealth implementation in Rwanda.

Results: In Rwanda there is a strong political will to use information communication technology in healthcare based on different guiding documents, plans and policies. Currently mobile penetration in Rwanda is at 68.1% rate, all health centers have access to 3G internet and the deployment of 4G LTD in the whole country has already started. Almost all district hospitals are connected to the national fiber optic, all provincial hospitals, referral teaching hospitals. 16 venues have access to high definition videoconference systems and the system is used for continuous medical education however there is no store and forward telemedicine system to manage patients’ transfers systems and telemedicine services is not yet incorporated in health insurance schemes.

Conclusion: Rwanda is now ready to start offering telemedicine services due to the availability ICT infrastructure and political will. Mobile phones could be used for home remote patient management,
low bandwidth store and forward and live secure desktop videoconference systems can be deployed. Efforts towards in hospitals networking, capacity building of staff, integration of telemedicine in health financing policies and health insurance and telemedicine guidelines will smooth the implementation.

**Keywords**: telehealth, readiness
National Research and Education Telecare and Telehealth Services Using Networks to support Healthcare: The Brazilian Telemedicine University Network RUTE
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National Research and Education Networks - NRENs worldwide are expanding capacities forming Academic Telehealth Community Collaboration of health scientists, bridging Science, Technology, Innovation, Education and Health Federal Authorities to discuss, finance and work together. RUTE, the Telemedicine University Network from Brazil, under the NREN RNP, implanted in December 2014 its 108th Telemedicine Unit in University and School Hospitals in Brazil, today in every one of the 27 states, and published the second book on its impact in the Brazilian Telehealth initiative and in Latin America (http://rute.rnp.br/noticias/-/rutelistaconteudo/Confira-a-versao-digital-do-livro-Rute-100-lancado-durante-o-Forum-RNP-2014-em-Brasilia/1866898_7Ij). As quoted in the foreword by Dr. Najeeb Al-Shorbaji, Director Department of Knowledge, Ethics and Research, WHO, “It is an excellent example of what a country can and has done and what lessons the world can learn from them.” It might provide thoughts and even guidance to policy makers. The model taken into consideration shows how an academic network manages to bring together a number of health institutions to work together to utilise information and communication technology to bring healthcare to people in remote areas and to those who need services most, remotely manage, educate, monitor and evaluate. Over the network collaboration model operates 48 Special Interest Groups in health specialties with 2 to 3 scientific videoconference sessions every day and 150 participant institutions. Telemedicine as a multidisciplinary approach to delivering healthcare, has been used by the network which itself is multidisciplinary. This brings the power of multiple institutions in a networked model to get the best of each one of them, bringing not only its expertise but also resources to make the network a success and to present many lessons to learn.

Keywords: NRENs, SIGs, Telemedicine University Networks

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International Distance Education Initiatives at SGPGI, Lucknow, India
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Background: Under the South to South co-operation policy of Government of India Pan-African and SAARC telemedicine Network projects were being launched in the years 2007-8. These projects are
being funded by Ministry of External Affairs (MEA), Government of India where in specialty hospitals are rendering tele-consultation and tele-education services.

Objective: Analysis of tele-education experience at SGPGIMS, Lucknow, a tertiary level academic institution in international telemedicine programme over last five years.

Methods: Telemedicine network under South Asian Association for Regional Cooperation (SAARC) was initiated by the MEA with the objective of connecting one/two hospitals in each of the SAARC countries with the Indian super specialty hospitals that include SGPGIMS, Lucknow and Post Graduate Institute of Medical Research and Education (PGIMER), Chandigarh. Jigme Dorji Wangchuck National Referral Hospital, Thimphu, Bhutan, Indira Gandhi Child Hospital, Kabul, Afghanistan and Patan Hospital, Kathmandu, Nepal were connected with SGPGIMS, Lucknow in October 2008, August 2009 and July 2010 respectively. PAN Africa eHealth Network Project was launched in the month of February 2011 in SGPGIMS. Six English sessions and Two French Sessions were conducted every month. Mostly the sessions are dedicated to Power point educational lectures in a dedicated studio.

Result: Participation in Pan Africa eNetwork is not so encouraging might be because of difference in language ascent, time difference & work load. Total 310 sessions (258 English CME & 52 French CME) were conducted in between 2011 to 2014 which was simultaneously transmitted to 47 African countries. During this period only 1505 participants has participated and raised just 130 questions in between the sessions. In the SAARC Network 66,184 and 71 lectures were transmitted to Bhutan, Afghanistan and Nepal respectively. Interaction was good with former two countries.

Conclusion: The outcome of five years of experience in transcontinental and transborder telemedicine programme focused on tele-education has brought in several issues which needs deliberation to maximise output for the investment

**Keywords**: trans-border telemedicine, inter-continental telemedicine

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**Promoting Health Literacy the eWay: A Preliminary Report from Rural Tamilnadu, India**

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In a pioneering initiative, this pilot study deployed ICT in rural Tamilnadu in South India, in 14 internet enabled villages to promote Health Literacy.

The aims were:
- To provide authenticated, validated, topical health information in a multimedia format in the local language, to a number of villages simultaneously, using multi point two way VC;
- To digitally archive all sessions including Q&A and make them available offline to the community including an abridged YouTube version;
- To quantify change in knowledge levels of the attendees immediately and six months later;
- To obtain feedback of the programme.

50 topics were identified. Articulate physicians well versed in the local language (Tamil) delivered lectures fortnightly. MSSRF (www.mssrf.org) a globally renowned NGO mobilized the community. Due to low bandwidth, the MCU bridge, was replaced with a licensed “Go to Meeting” software. The 25 minute talk was followed by a 30 minute Q&A. MCQ’s on the topic (before and immediately after...
the lecture and six months later) and feedback forms were filled by the attendees assisted by volunteers.
8236 individuals (2828 males and 5408 females) attended 40 sessions over 21 months. Average attendance was 212 (102 to 458). An average of 7 (4 to 12) villages participated Knowledge levels increased by 15.3% (31 to 86).
The wide scatter was attributed to unfamiliarity with MCQ mode. Feedback from 72%, indicated a high level of acceptability of the e talks (55% good, 12% excellent). Occasional technical glitches were rectified. The major challenges in assembling villagers for tele lectures and making them view this as a Value Added Service were identified. A detailed analysis will be presented, accompanied with video clippings depicting the enthusiasm of the teacher and the taught. An unexpected result was knowledge diffusion among the non-attendees leading to community empowerment.
This cost effective deployment of ICT provided patient knowledge empowerment in rural India. Preliminary observation justifies a larger study to promote health literacy in rural India the e-way. Hopefully this will have an impact on health outcomes.

Keywords: health literacy, multipoint VC, rural India

Building Interaction Scenario Situation for e-Learning Training, Stepped By Decision Tree: A Simple Training Game
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Decision tree is a graphical way to view consequences of choices. Decisions are related successful or incomplete successful or unsuccessful prediction result. It can be used to give ability to learn and make decisions, evaluate and detect faults in process and generate information for correction. Medical procedures can be organized in steps; each can be decomposed in graphic schemes. Medical procedures have logical sequence of execution without which they cannot be performed correctly. For example to perform tracheal intubation is necessary to open patient mouth. Only viewing this algorithm is not sufficient for medical team training. The sedimentation and comprehension it must be associated with real situations. In medical situations, branches of the decision tree can determiner choices that outcome is success, partial success (which affects but does not compromise on the outcome) and failure (which compromises result). Teacher can observe student performance; evaluate application of knowledge in this scenario and use of knowledge offered in class.
Our objective is to evaluate creation of decision trees for training students at a distance, associated real scenarios, and appropriate punctuation. Allow the student to access tree as often necessary for their successful execution. Several decision trees were created: classify victims in an accident of multiple victims, how to proceed in accidents with toxic material, tracheal intubation and care of patients in cardiac arrest. These decision trees designed in scenarios and scored using the SCORM program. These scenarios were used in training programs. Partial result showed: interaction with the content; Application in conventional classes facilitates discussion, achieving greater interaction with audience; Student in distance platform also interact with their tutor. Greatest difficulty observed in preparation of the material was – the branches, i.e. numbers that solved using selection of principal’s
steps and score punctuation. Score punctuation must be adjusted to the possibility of successful and partial successful and/or unsuccessful attempts.

**Keywords:** e-learning, interactive game, decision tree

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e-Learning Training to Get the Ability to Obtain and Select the Appropriate Knowledge: Discussion Forum

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Facility to get information and knowledge, today, bring great challenge for educators: how to select and appropriately apply this information. Teaching this process is difficult. Traditional lectures leads to an aspect of teacher's knowledge side. Furthermore, speed new information post is difficult to debug and update. Already, student has access to information easier than in the past and several times it may be in conflict with teacher content.

Tutorial is another way of teaching, where teacher guides student on obtaining information, student research generates an ordering report, and knowledge is debugging with professor. In this second model, student acquired essential tool in their professional development: how to find and selected the adequate information. Distance education platforms provided some tools that enable this train (check, debug and synthesize knowledge of a particular subject). One of these tools is the discussion forum.

**Objective:** Evaluating the efficiency of discussion forum applied to fourth-year medical students in discussion of some diseases.

**Method:** Discussion forum was available on Moodle platform for fourth-year medical students at University of São Paulo. Content was presented using demonstration of disease through a 3D animation created by the Discipline of Telemedicine. Suggested questions about this disease were placed and students had three weeks to post their responses based on book search, scientific journals, Internet and knowledge acquired in previous years. Teacher monitored the posts. A qualitative questionnaire to evaluate the method at forum end was held. Participation was not mandatory.

**Result:** Total of students enrolled was 84 students. Total number of students who accessed platform was 49 (58.3%). Observed: 50-60% of students who visited forum had posted. Evaluated content of these posts show that these students researched the subject. Knowledge synthesized - demonstrating students' ability when stimulated to search and get adequate knowledge. Qualitative questionnaire responses showed around 80% satisfaction.

**Conclusions:** Discussion forum allows an interaction between teacher and student. Student is able to develop research and obtaining adequate medical knowledge.

**Keywords:** e-learning, discussion forum, Moodle platform,
The Utilisation of Online Bibliographic Databases by Medical Professionals in Rwanda: Case of UTHK
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Introduction: Online bibliographic databases are increasing access to evidence based resources. The practice of medicine gets improved based on different evidence based research. The practice of evidence based medicine requires health professionals to have the skills of searching and accessing evidence based research for clinical decision making. The main objective of this study was to assess the utilisation of online bibliographic databases by Medical professionals at University Teaching Hospital of Kigali.

Methodology: A quantitative cross-sectional design was used for medical Doctors at Kigali Teaching Hospitals. Chi-square was performed to determine the association between variables.

Results: The results of this study indicate that the most used online bibliographic database at UTHK is PUPMED (Medline) at the rate of 94%. More than 92% of medical doctors do have computers with internet in their office. 89% of Medical doctors know how to enter HINARI. Most of medical doctors 91.5% have only basic searching skills. Almost all medical doctors are computer literate at 82% and the majority of medical doctors 63% have been trained on evidence based medicine literature search. Medical doctors at the rate of 97.6% have used online bibliographic database in the past six months and 95% were satisfied with their expectations. It argues that training in evidence based literature search (P=0.632), proficiency in computer (P=0.166) are not the factors that justify the use these e-resources.

Conclusion: The study concludes that the use of the online bibliographic databases is still limited among Medical doctors at University Teaching Hospital of Kigali and recommends more continuous capacity building in advancing searching skills for accessing and using trusted online evidence based medicine literature within the health facilities.

Keywords: online bibliographic database

Knowledge Management Techniques for Building Best Practices Reference Library in the e-Health Field
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The aging populations, rising healthcare costs and increasing number of chronic diseases requiring long term care have been the major challenges of healthcare systems for the last decades. To handle this issue, modern eHealth systems are promoted where more and more patients are treated and taken care of in their own homes. However, designing such systems is complex and requires the integration of organizational, medical, social, legal and technical aspects to achieve optimal outcomes. To maximize the like hood success of eHealth projects, we need to use and to capitalize on domain knowledge and eHealth projects’ best practices. The main goal is to make essential information available to ensure a smooth transition and transfer of corporate memory when key players leave the organization or when new projects are started.
In this paper, we suggest to build an organizational memory system (CapCoEx) based on the capitalization of homecare domain knowledge (e.g. homecare ecosystem, laws, etc.) and feedbacks on e-health projects’ performance (e.g., key stakeholders, business models, etc.). Unlike existing works that focus on one dimension (mainly technical), we bring a new look on the construction of the organizational memory’s representation and its exploitation by placing the user in its centre and by relying on multidimensional information (technical, social, organizational, economical, legal aspects). CapCoEx is then built from the information exchange between the different stakeholders of an eHealth project in a collaborative environment, using the platform MEMORAe. This Web platform allows to capture and to organize, around a knowledge map, explicit or tacit knowledge produces by collaborative teams. The platform was developed to facilitate the organizational learning and the capitalization of the knowledge using a semantic modelling in order to define a common reference guideline. MEMORAe uses new collaborative and intuitive support tools and leans on the standards of the Semantic Web. Our approach is based on our experience in different French multi-partner projects which aim to design and develop homecare systems and to assess them on a pilot scale.

**Keywords:** homecare, knowledge management, MEMORAe
The Women Observatory for eHealth (WeObservatory) Develops an Intelligence MOOCs Commons for Women and eHealth
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Massive Open Online Courses (MOOCs) provide an important educational resource to empower women around the world. Available in an ever-growing number and range of topics, MOOCs are offered in different languages and often for free or at minimal fees. To help its members take advantage of this valuable resource, the Women Observatory for eHealth (WeObservatory) of the Millennia2025 Foundation launched its Intelligence MOOCs Commons for Women and eHealth, which focuses on courses addressing the intersection of global health, women and Information and Communication Technologies (ICTs). The MOOCs included in the Commons are scanned and selected by specialized advisors and members of the Foundation, and cover three of the six UN official languages—English, French and Spanish. In 2014, the advisors identified and selected 72 MOOCs in English, and a handful of courses in the other two languages, covering various topics of interest to women, such as nutrition, nanotechnologies, diabetes, epidemics, AIDS, and nursing. Although the majority of MOOCs are offered in English, the number of courses available in French and Spanish has been increasing steadily since the WeObservatory launched the MOOCs Commons in 2013. The goal of the Intelligence MOOCs Commons for Women and eHealth is to strengthen a corpus of specialized advisors to improve the selection and number of MOOCs, thus facilitating the access of women around the globe to online education in the area of health and ICTs.

**Keywords:** women, MOOCs, eHealth, telemedicine, education

Mentoring Young Scientists and Engineers in Interdisciplinary Domains
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In last decades the effort to increase the number of women applying for studies at technical universities, and consequently for a job in the field of technology, can be seen in European countries. However, the amount of female students and subsequently graduates in technical fields is still quite small. One of the possible ways how to support them in their career development is mentoring. Mentoring is a process of continuous and dynamic feedback between two individuals to establish a relationship through which one person shares knowledge, skills, information, and perspective to foster the personal and professional growth of the other. It is a different relationship than supervision which is usually pre-established and does not necessarily lead to the personal growth of the individual. Mentoring is quite frequently used within an institution to help new members of staff. It
is interesting that active and successful mentoring programs can be found in life sciences but not so frequently in engineering or strongly interdisciplinary areas, in particular on the edge of engineering and medicine or biology. Mentoring programs can be based on different models of interaction. Some forms could be better adjusted for newcomers, some for more experienced employees. A group peer, collaborative mentoring model founded on principles of adult education is a good example of the latter mentoring form.

With fast development of interdisciplinary research and development, interdisciplinary mentoring has become more important and prevalent over the recent years. Interdisciplinary mentorship is the tool of scientists to help produce synergy in group, and to generate multifocal ideas and complex solutions to complex challenges. Here we should mention that it is frequently more useful and enriching if the mentor and mentees are coming from different disciplines and even from different institutions because they can view all the issues from slightly different points, bring new opinion and perspectives, and are not bound by processes and relations in the institution of the mentees.

In the paper we will discuss basic models of mentoring programs and good practice examples in more detail.

**Keywords**: mentoring, interdisciplinary domain, collaborative model

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**Improved Midwifery Education with Digital Competences for Mexican and Latin American Indigenous**

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United Nations Population Fund published research on 73 low- and middle-income countries, including Mexico, in the 2014 State of the World’s Midwifery Report. Conclusions are that greater investment in midwifery is the key to making the human right of access to quality health care a reality for women everywhere, and investments in midwifery training “could yield a 1,600 per cent return” (UNFPA, 2014). Unfortunately, in Mexico, women, especially indigenous, die needlessly due to preventable complications related to pregnancy and birth. CASA, a nonprofit organization, runs Mexico’s only government accredited professional midwifery school. More than 10,000 babies have been born at the School’s teaching hospital, which is run by midwives. Outside evaluators conducting retrospective and prospective studies have demonstrated that CASA midwives attain lower mortality and morbidity rates, lower low birth weight rates, higher lactation compliance, and lower cesarean rates than both the private and public spheres (INSP, 2011). Current number of midwives that graduate annually is insignificant compared to the number of births per year. Physicians actually attend most of the births; the country’s 16,000 obstetrical nurses rarely attend and research demonstrates that curricula for physicians and obstetrical nurses do not include half of the internationally recognized competencies for this work (Reproductive Health Matters, 2007:15(30): 50-60). Hence, in 2013, CASA began an ambitious project, designed and executed by an international and interdisciplinary team, to develop online training in midwifery and information and communication technologies (ICT), with the goal of improving community health, particularly for indigenous groups in rural areas, in a faster and cost-effective manner. The main objective is to build a primary health workforce with strong midwifery skills, digital competencies, and familiarity with
e/mHealth and telemedicine in Mexico. In 2014, CASA launched its pilot 100-hour training course, composed of 7 modules, which seeks to prepare participants to become ICT trainers and effective future leaders in midwifery. An evaluation of this effort is in process.

**Keywords**: midwifery, eLearning, indigenous, rural, education

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**Where There Is No Hospital: Mobile Sonography Devises To Reduce Maternal and Foetal Mortality and Morbidity**

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Pregnancy is complex and unpredictable. High-risk pregnancies, where complications are likely, require managed care in a hospital with emergency obstetric facilities, and in populations with limited access to professional health care women and babies die at significantly elevated rates. In Australia the mortality rate is 6-100000 but women in rural and remote areas and indigenous women suffer 3 times that mortality. In Timor Leste where 75% of women live in areas with limited access to trained health professionals or hospitals, the rate is 300-100,00, 50 times greater than Australia (WHO2013). In both contexts an inexpensive mobile device that would allow the remote recognition of risk factors early, thus allowing time to intervene and provide the emergency care needed, would save the lives of women and their babies. Key tool to assist Obstetricians and Midwives in their clinical decision making is the diagnostic information obtained through sonography devices such as stethoscopes, fetoscopes, Doppler and ultrasound.

We have developed and validated a design for an inexpensive stethoscope (ca. $10 cost) that connects through the headphone jack of a mobile phone. The diagnostic information captured and converted through a transducer to digital form can be sent over regular mobile networks. This diagnostic system allows the health worker with the patient to maintain communication in real time with an expert and be guided as to placement of the scope to capture the diagnostic information. The expert, able to hear and interpret the information, can then make a diagnosis based on accurate information. Since Doppler and ultrasound are also analogue based systems, we anticipate that our approach will readily be extended to these modalities. The expense of diagnostics is in training radiographers to evaluate data interpreted by expensive equipment. Cheap available technology can be used to simply capture the data and transmit it via mobile phone to the facility with the interpretive capacity. Anyone with a mobile phone will have access to life saving expert diagnostic information.

**Keywords**: mobile, sonography, diagnostics, maternal, mortality

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**Telehealth in Nigeria (Mirage or Reality): A Review of Literature**

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Introduction: There is sufficient evidence in literature to support knowledge translation of tele-health to practice in health education and advice, communicating patient reminders, monitoring clinical status, or delivering interventions globally. The uptake of tele-health in Nigeria appears inadequately defined.

Aim: This paper presents results from a preliminary review of literature on the scientific evidence of tele-health in Nigeria.

Methods: Literature review of published peer-reviewed empirical research was undertaken. Databases accessed for relevant empirical articles were Google Scholar, Medline and PubMed. Search terms were telehealth, e-health, telemedicine, mHealth, eHealth care and eHealth. Only free abstracts and articles published in English language from 2000 to 2015 that were particularly focused on the Nigerian situation were considered for inclusion in this review. An initial scoping search of Medline was undertaken using the identified search terms, 64 articles were obtained from the initial search. After an analysis of the text words contained in the titles of the index terms used to describe the identified articles, 30 articles were identified. After an assessment for relevance to the review based on information obtained from the title, abstract and description, only 17 free full text articles/abstracts were identified for inclusion in the review. A search of Google Scholar was done to further ensure that all relevant studies have been identified and 11 additional relevant studies were identified.

Results: Most (93%) of the studies identified the potentials and need for telehealth in Nigeria. Over half (60.7%) of the studies supported the use of mobile phones technology for health information, surveillance and services with only 25% of these studies focusing on evidence for its effectiveness on outcomes of care in some clinical conditions. Few (11%) of the studies provided information on the use of internet-based telemedicine. Some of the findings (32.1%) from the reviewed studies highlighted some challenges and implementation issues of tele-health uptake in Nigeria.

Conclusion: It appears there are few published studies on the implementation of tele-health in Nigeria compared to the overwhelming evidence of its implementation and uptake in developed world. The need for promotion of educational and awareness programmes at all tiers of healthcare delivery, inadequate healthcare infrastructure and lack of qualified and trained healthcare professionals in Nigeria were identified challenges that need to be vigorously addressed for telehealth to become a full-fledged reality in Nigeria.
When Practice Makes Perfect: A Solution for Telerehabilitation That Works
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This virtual rehabilitation platform is developed with user driven processes and its story so far is one of a truly innovative project. It has its origin in a suggestion posted by users on “Invia” an online submission platform for project ideas. The idea was accepted by the innovation panel behind the Invia platform and the project was carried out through user driven processes.

The result is a solution that has proven to be easy to use and implement for physiotherapists and patients. The solution consists of a virtual rehabilitation platform that gives the patient access to an individually tailored training programme put together by a physiotherapist or clinician. The patient can access the training programme from a PC, Tablet or smartphone, thus relying entirely on the patients’ own equipment (Bring You Own Devices). The training programme is a set of high quality video demonstrations of exercises they are to perform when exercising at home. The patient can choose to receive reminders on the days they are to exercise and after each virtual training session they are asked to state their experience of their efforts, pain and strength required to complete the exercises. The physiotherapist or clinician has access to an aggregated version of the answers and can adjust the training programme remotely if necessary. Furthermore, the patient can contact the therapist via a messaging service embedded in the virtual rehabilitation platform if they have questions that cannot wait until the next face-to-face training session. The purpose of the virtual rehabilitation platform is to support patients during rehabilitation to comply better with the training programme they are to perform at home between sessions and to reassure them as to which exercises they are to carry out and how they are to perform them, thus empowering them to take more responsibility for their own rehabilitation and recovery. The solution has been up and running since June 2014 and the number of users is still growing. We will present the solution and our experiences with running and implementing it with physiotherapists, patients and clinicians.

Keywords: telerehabilitation, mHealth, telemedicine, innovation, user-driven
Introduction: Preoperative and postoperative rehabilitation may significantly improve clinical status of patients suffering musculoskeletal disorders. Several projects were designed and implemented at the facility to find out efficacy, effectiveness, user satisfaction, usability and other measures of musculoskeletal telerehabilitation (TR). The aim of this study was to analyze and summarize effects of telerehabilitation implemented at the facility.

Material and methods: The facility experience derives from TR studies. Patients were surveyed about their symptoms, outcomes, satisfaction, platform usability and other issues. The outcomes instruments including the Harris Hip Score (HHS), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the 36-Item Short-Form Health Survey (SF-36), and the Hip disability and Osteoarthritis Outcome Score (HOOS) and VAS score were used.

Results: Significant improvements were noted after TR, Internet based treatment in several domains of health function and the quality of life. Patients suffering severe osteoarthrosis could gain benefits from TR expressed in most scores of Patient-Oriented Outcomes. Patients reported significant satisfaction from using the TR platform, advantages, and ease use of the platform. Patients would like to recommend this form of rehabilitation to other patients. During exercising patients can be remote mentored by a physiotherapist via the Internet. The individual rehabilitation can be safely treated due to the remote vital signs monitoring.

Conclusions: TR is considered effective and improving quality of service in patient’s subjective opinion. The most of the patients would continue home therapy with supervised on remote, having individually tailored schedule and clear instructions. It can be easily utilised by adult patients regardless their age. TR seems to be a supplementary for dispensing rehabilitation services before patient’s admission to the hospital for the surgery and after patients are discharged from an acute hospital or rehabilitation unit. Patients can mostly benefit from rehabilitation through teletreatment.

**Keywords**: telerehabilitation, outcomes, benefits, musculoskeletal

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**Home Telerehabilitation Service for Persons Following Lower Limb Amputation**

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Rehabilitation of persons following lower limb amputation should start immediately after the amputation. It should continue until the full reintegration into community. In Slovenia, due to lack of capacities and professionals, after discharge form surgical ward, majority of persons go home where they should physically recuperate on their own without professional support. They start their walking programme with prosthesis approx. 2 months later.

The aim of our project was to develop a telerehabilitation service that will enable continuous rehabilitation under professional supervision within their home environment.

An interactive Cloud based multimedia (movie) service was designed, developed and established that was available to five patients after unilateral trans-tibial amputation. Each patient was physically and functionally assessed through standardized PT and OT tests before and after using the service. The patients were equipped with tablet PCs (Samsung Galaxy Tab 10.1) linked to a mobile network and
Internet. For each of them an individualized program (training) was prepared consisting of a group of movies available through the Internet. The movies presented a programme to be exercised by each patient at home before an admission to in-patient rehabilitation. The exercises were grouped and delivered one after another. The patients were remotely supported by a distant therapist visited them weekly by a videoconference system (Skype). Based on the results of the training the therapist determined the next group of exercises (movies) to be practiced until the next visit.

26 videos were prepared (13 from PT, 14 from OT) each prescribed to at least one patient, some to all. Individual prescription contained 7-17 different videos. Patients watched them from 0–11 times. The therapist had 2–7 videoconferences per patient. The service was used by the patients up to 2 months.

All the patients and the therapists found the telerehabilitation useful. Preliminary results are encouraging and indicate that the telerehabilitation approach was adequate and that can successfully fill the gap in the rehabilitation. In the future the service will be tested by stroke patients.

**Keywords:** telerehabilitation, amputation, multimedia, tablet-PC, video-conference

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**Tele-Physiotherapy: Awareness and Knowledge of Physiotherapists in Nigeria**

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**Introduction:** The implementation of Information and communication technology (ICT) is becoming more popular and important in almost all disciplines and professions. It is particularly important in the health sector where it serves as a means for easy accessibility of health care services. Studies have been carried out on awareness, knowledge and practice of telemedicine but few have been published in Nigeria. There appears to be no published study on awareness and knowledge of tele-physiotherapy.

**Aim:** This study was designed to investigate physiotherapists’ awareness and knowledge about tele-physiotherapy in South-west, Nigeria.

**Materials and Methods:** Participants were selected from twelve health and training institutions in South-West, Nigeria through a sampling technique of convenience into this cross-sectional survey. Data was collected using a structured, self-administered validated questionnaire. A total of one hundred and forty questionnaires were distributed to the physiotherapists, out of which one hundred and twenty nine questionnaires were completely filled and analyzed. Data were analyzed using descriptive statistics of frequency, means, percentages, pie charts, bar charts, and Mann-Whitney U test, with level of significance set at α= 0.05.

**Results:** The participants comprised of 62 females and 67 males aged 37.36 ±7.12 years. Ninety participants (69.8%) were familiar with the term tele-physiotherapy; their sources of information were varied. Seventy nine (87.8%) reported positive perception of tele-physiotherapy. Sixty nine participants (76.7%) reported good knowledge of tele-physiotherapy while twenty-one (23.3%) participants reported fair knowledge. Participants’ awareness and knowledge about tele-physiotherapy did not differ significantly by type of institutions.

**Conclusion:** Physiotherapists in Nigeria appear to be well educated about the use of information and communication technology in physiotherapy clinical practice. This is hoped to translate to the implementation of tele-physiotherapy in Nigeria clinical practice.
Keywords: telehealth, physiotherapists, awareness, knowledge

Fostering Digital Health Innovation and Research Adoption: An Example Involving Occupational Therapists (in Sheffield)
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Not unlike in other countries, the United Kingdom has increased impetus to using digital technologies in healthcare and care professionals engaging in research and development are both driven by government. Through enhancing the adoption of well evidenced research outcomes, improved efficiency and improved patient care is anticipated, staff willingness and openness to technological innovation and research is a key issue for adoption. Occupational Therapists have been called ‘the gatekeepers’ of technology but this has not necessarily prepared them for technological service and tools innovation.

A case study of a knowledge exchange partnership between health service and university staff aiming to encourage involvement in technological related research - is described. Occupational therapists, working in a busy acute hospital setting, are sharing their clinical insights about needed innovation of technology and associated services with local university researchers. The ‘Collaboration Aiming to Build Occupational Therapy research (CABOT)’ partnership goals are that joint teams with the right expertise will form and then apply for research and development funding, leading to a sustained long term highly successful partnership. The clinical insights are shared through ring-fenced (for confidentiality) but otherwise internally open innovation. Namely ideas are shared, interested-staff start to discuss – some of whom state they are willing to lead, and when ready, they form a team who have started to develop their project through formulating research questions and protocols. Brokering relationships and in depth discussions about the ways that patient care is delivered has given rise to over 70 ideas for a wide variety of technology and service innovations but mainly digital. Observations suggest that the occupational therapists desire and are open to embrace use of digital technology, e.g. electronic health records, telecare, e-Health, telemedicine as well as patient diagnosis specific needs. In the fullness of time it will become evident if this approach to greater adoption of digital healthcare and research successfully engages a higher proportion of a profession.

Keywords: digital technology, innovation, occupational therapy

Utilisation of e-Health System in Awareness and Rehabilitation of Schizophrenia Patients in Southern Punjab
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In e-health system psychological and emotional disorder cases rarely get registered and patients also hesitate to approach a proper psychologist. In the possible reasons religious believes and community pressure can be blamed as key constraints. While discussing with such patients local and personal coined terminologies create hindrances in understanding the issues.

As test case a family comprising on three Schizophrenia patents belonging to district Rajan Pur, the family comprising son, mother and uncle were examined through Tele-medicine system at mayo hub for 9 months (from April 2011 to January 2012). The disease in the abnormal balance of the neurotransmitters dopamine and glutamate may have something to do with schizophrenia. The life quality of the test family was measured on Cramer, 2008 guidelines based on quality interview. In this regards level of Function scale were assessed on “Quality of Life Interview” by Hays and Reeve, 2008 interview based on collected using self-report methods of assessment. The test family patients were interviewed at interval of fifteen days. The patients recovered in nine months.

From these studies we concluded that tele-medicine system can be successfully applied on religious extremism, psychological and emotional disorders by little improvement in audio video system and human resource development at remote station.

**Keywords:** psychiatry, schizophrenia, Southern Punjab, telemedicine

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**ePrevention: Sexual Abuse in Adolescents in Owerri - The Family Characteristics and the Long Term Implications**

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Child sexual abuse (CSA), according to the World Health Organization, is the involvement of a child in sexual activity that he/she does not fully comprehend and is unable to give informed consent. The family context in which CSA typically occurs has been characterized as disorganized, conflicted, inflexible, violent, etc. CSA is found to be associate with depression as well as poor language and mathematics proficiency.

This study aimed to find out the prevalence of sexual abuse in adolescents studying in public schools in Owerri metropolis, the perpetrators of the CSA, the prevalence of family dysfunction in the adolescents and the long term associations with their psychological and cognitive functions. The study is cross sectional, involving 1128 participants in the senior secondary class, spread across 8 public schools in Owerri metropolis, the capital of Imo state, Nigeria. Self-administered questionnaires of Adverse Childhood Experiences and the Patient Health Questionnaire for adolescents were used. The end of the year school results for three previous years were collated for academic performance using the West African Examination Council grading system.

The result showed that 20% of participants were sexually abused, 100% of the perpetrators were known to the victims, 69% of the adolescents who were sexually abused came from dysfunctional families, 64% suffered from depressive disorders and none had an ‘A’ grade in academic performance.

In conclusion, sexual abuse is prevalent in dysfunctional families in Imo state, suggesting a need to create a virtual forum for educating parents on good parenting practices and good family relationships to enable them make informed decisions for their actions. Parents and teachers need
to educate children as well as adolescents on sex matters while school mental health programmes need to be established in secondary schools in the state.

**Keywords**: sexual, abuse, adolescents, family, depression
Automatic Stress Detection Using Simple Telemedical Heart Rate Meters
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Stress can be defined as a feeling of strain and pressure. Long periods of stress can be very harmful for the health as and it can lead to various conditions like cardiovascular disease, asthma, obesity or depression. For an effective lifestyle support system it is important to have a tool to measure stress during daytime. In order to automatically detect stress in ambient assisted living (AAL) systems, various physiological parameters have been investigated recently like galvanic skin response, temperature change of fingertips, tension in muscles, and heart rate parameters. Heart rate variability (HRV), being simple and noninvasive to measure, has recently become one of the most popular methods for detecting stress. Still, this is not an easy task since HRV encompasses several parameters that can be observed in time-domain, frequency-domain or using nonlinear analysis. There is yet no general agreement in the literature on the choice of the best stress marker HRV parameters.

The aim of this study was to analyze various HRV parameters in order to identify those that change significantly under the influence of mental stress. 48 healthy volunteers participated in the experiment. 10 subjects were excluded due to excessive artifacts in the measured data, probably due to the improper placement of the chest belt.

The experiment was divided into two parts with duration of 10 minutes for each part. In the first part relaxation music was played with a purpose to relax the subject while in the second part the subjects were asked to play a game based on the Stroop color test, in order to provoke mental stress. RR intervals were measured using CardioSport TP3 Heart rate transmitter (chest belt), a low cost commercial heart rate meter which we tested for reliability in a previous study. Parameters for the two parts were analyzed using Wilcoxon paired samples test. We found that the following parameters showed significantly different values: mean RR (p=0.0001), mean HR (p=0.0001), pNN50 (p=0.0494), LF (p=0.0302), HF (p=0.0105). Based on these results we can conclude that a simple, low cost heart rate meter could provide a reliable estimation of the state of mental stress.

Keywords: stress, heart rate meter, telemedicine
The process of diagnosis, rehabilitation and post-intervention care over patients with hearing disabilities, often equipped with different kinds of hearing prostheses, usually requires an experienced, multidisciplinary team to undertake repeated sessions with the patient in the clinic. For the majority of patients it entails long travels from their home, associated with high cost, time, and travel weariness. To reduce patients’ burdens and allow specialist from the field to benefit from the experience of the World Hearing Center’s (WHC) team, the National Network of Teleaudiology (NNT) was established.

The NNT was introduced in 2009, with the aim of providing a wide range of telehealth applications like telefitting, telediagnostics, speech and hearing telerehabilitation or teleeducation. It was developed based on previous experiences of the Institute’s team in the field of telemedicine in audiology and otorhinolaryngology dating back to the 2000. The NNT enables:

- Comprehensive support for patients using all types of hearing implants, provided as a part of the uniform, all-embracing care tailored to the specific needs and abilities of this group of patients;
- Coordination of the rehabilitation process aimed at restoration of patients’ auditory perception and verbal communication skills;
- Cooperation of the multidisciplinary team of experts combining their knowledge, experience and achievements for the benefit of the patient.

The NNT consists of 20 cooperating centers in Poland and 1 in the Ukraine. The center of the NNT is the WHC in Kajetany. Every center of the NNT is equipped with state-of-the-art videoconferencing software and hardware and is connected to a system with wideband symmetrical Internet connection. Over 40 support specialists from cooperating centers and more than 20 experts in the WHC from different fields use the NNT in daily clinical practice, consulting several dozen cases every month. The NNT has proved to be a reliable platform for many telemedical solutions including telerehabilitation, telediagnostics, telefitting and teleeducation.

**Keywords:** hearing, telerehabilitation, telediagnostics, telefitting, telemedicine

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**e-Consult Face-to-Face Conversions**

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**Background:** Mayo Clinic offers a variety of econsultations with specialty providers. At times a “face-to-face conversion” occurs where an econsult is followed by a face-to-face visit with the same specialty within a relatively short period of time. When this occurs, econsultation could still provide value in the form of test recommendations made by the consulting specialist that could be performed before the face-to-face visit.

**Methods:** We analyzed all 5,334 econsultation requests for the eight specialties of pulmonary, psychiatry, nephrology, infectious disease, hematology, gastroenterology, endocrinology, and cardiology from January 2012 through June 2013 for face-to-face conversions. We randomized 20/50 of these face-to-face conversions for content review and characterization. We reviewed for diagnostic complexity, treatment complexity, whether specific test recommendations were made by the specialist consultant and the presence of a specific statement by the consulting specialist.
recommending a face to face visit. Categorizations were not mutually exclusive; each face-to-face conversion could have more than one category coded.

Results: The number of face-to-face conversions within 28 days of econsult (out of total econsults) per specialty was: Hematology 132 (out of 970), Gastroenterology 79 (out of 860), Endocrine 77 (out of 735), Cardiology 94 (out of 701), Nephrology 63 (out of 544), Psychiatry 48 (out of 520), Pulmonary 43 (out of 410), and Infectious disease 13 (out of 375). After randomization a total of 151 face-to-face conversions were reviewed. The most common category found for face-to-face conversions was diagnostic complexity 76/151 (50.3%). Face-to-face conversion was explicitly recommended by the consulting specialists 89/151 (58.9%) of the time. When a face-to-face conversion was explicitly recommended by the consulting specialist 36/89 (40.5%) of the time specific test recommendations to obtain before the face-to-face visit were also given.

Conclusions: e-Consult face-to-face conversions appear to occur most frequently for diagnostically complex scenarios. The majority of face-to-face conversions are recommended to be seen for a second opinion.

Keywords: econsult, e-consult, tele-consulting, remote consultation

Practical Experience in the Use of Telemedicine in Sports Medicine

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Sports medicine in the Russian Federation is a separate specialty. The duties of a doctor in sports medicine are the regular medical care of persons engaged in physical culture and sports, the prevention of injuries and diseases, health promotion on the stages of physical education, athlete's dispensary observation, and medical support of competitions and so on.

In the Nenets Autonomous Okrug every fourth resident is engaged in physical culture and sports. Sports medicine organization in the region is complicated by the its isolated geographical location and the shortage of staff. Under these conditions, real help is provided by telemedicine solutions. For the period 2011-2014 we conducted 58 telemedical consultations on issues of pediatric cardiology, neurology, ophthalmology and sports medicine. I.e., in 58 cases were saved financial and other costs associated with conducting face-to-face consultation with a specialist. Especially 27,000 dollars was saved on the flights. Consultations were carried out to obtain a second opinion, diagnosis specification, advice on patient surveillance, the admission to sports.

The potential of telemedicine in the field of sports medicine are:

- Case follow-up of athletes,
- Remote transmission of individual physical and functional parameters of the athlete in the framework of the monitoring of their health,
- Clarification of the indications for face-to-face consultation,
- Distance learning,
- Advisory (remote) support team of athletes on the road,
• Psychological (remote) support for athletes,
• Carrying out of remote courses of sports rehabilitation treatment, group rehabilitation and strengthening exercises.

**Keywords**: telemedicine, sports medicine, NAO

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**Telemedicine in Hearing Screening**

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Introduction: Telemedicine has become an important medium for improving health care services and facilitate access to medical specialists and reference medical centers. Telemedical programs have been developed at the Institute of Physiology and Pathology of Hearing for several years, and play a key role in the activity of World Hearing Center (WHC) in Kajetany. Among many forms of telemedical activity of the Institute, one can distinguish programs of teleaudiology, especially concentrating on hearing screening and epidemiological investigations in the population of pre-school and schoolchildren.

Aim: To show the application of modern telemedical tools and procedures in hearing screening programs.

Material and Methods: The long term experience of the Institute in realizing hearing screening program is based on 500 000 screened school age children since 2007 during different national and regional programs. All this was possible only with use of modern equipment and telemedical tools. During this time we use palmtops and Sensory Examination Platform\(^\circ\) with the Sennheiser HDA 200 audiometric headphones. All the results were sent via the Internet and collected in a special telemedical database developed for the purpose of coordination of large scale screening programs. This Base of Knowledge System allows data collecting, revising tests results by specialist - audiologists as well as monitoring of key quality factors of performed tests and coordinating all the necessary logistic.

Results: Since 2007 over 500 00 children were screened, 13% to 18% of them had positive result of the screening tests according to the criterion were positive result of the screening test was defined as any hearing impairment greater than 20 dB HL in any ear, at any frequency from 500 to 8000 Hz. Conclusions: Results of screening programs shows the large scale of different hearing problems among school age children. Using modern telemedical tools enables team of specialist to conduct sufficiently and in short time large scale hearing screening programs on the national and international scale.

**Keywords**: teleaudiology, telemedicine, hearing screening
**e-Health System: A Tool for Investigations on Demographic Distribution Pattern of Dermal Diseases in Remote Beneficiary**

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Dermatology Department King Edward Medical University/ Mayo Hospital, Lahore is actively contributing in successful running of the medical system with its consultation services. Since 2009 up till 2013, it has provided consultancy services to more than 16000 patients in the beneficiary network consisting of Gugrat, Jhang, DG Khan, Attock, Sahiwal, Khushab and Rajan Pur. On compiling the data, the picture of disease distribution pattern appeared. Among different skin related diseases, most commonly seen problem was superficial fungal infections (of six types) namely Tinea capitis, Tinea corporis, Tinea faciei, Tinea cruris, Tinea incognito and Tinea mannum. Among other notable diseases worth mentioning were, acne vulgaris, nodulocystic acne, scabies with and without secondary bacterial infections and secondary eczematization, alopecia areata, sycosis barbae, impetigo bullosa contagiosa, ichthyosis, DLE (discoid lupus erythematosus), Hirsuitism (polycystic ovarian syndrome), leishmaniasis and among herpetic infections recurrent herpes simplex labialis and genitalis, viral warts, molluscum contagiosum, condyoma acuminate and lata. Distribution frequency of the data showed that the mentioned skin diseases were more seen in age group between 20-50 years age group with equal gender distribution. The victimized group was mostly due to unhygienic & poor socioeconomic living standards. While the distribution frequency of skin diseases namely DLE (discoid lupus erythematosus), Nodulocystic acne with hirsuitism (polycystic ovarian syndrome) and Herpetic infections belonged to middle class.

The key objective of presenting this study is to highlight the importance of telemedicine academically in health structure showing the prevalence and the ice burg of the problem. The system also provides opportunities to involve experts from diversified groups of medical field esp. psychologists, educationists, media and policy makers to rehabilitate poor masses of remote areas.

**Keywords**: cutaneous diseases, tinea, telemedicine, e-health

**Big Data Analysis Applied to a Preliminary Study of Domestic Violence**

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Domestic Violence represents one of the main problems that occur worldwide in society of all countries regardless of cultural differences. It is shown that the background of the aggressor is one of the key factors that make the risk

Given this increasingly common problem, the goal is to detect or attempt to minimise these cases, seeking common ground or similar patterns in cases of previous attacks. Note the difficulty of achieving these confidential data but such studies are increasing exponentially within the theme of Big Data and Artificial Intelligence.

These Artificial intelligence techniques are now an emerging methodology as decision support systems in medicine, and it could be very useful also in forensics areas.
We start with a database of 885 cases, reduced to 352 interesting cases of aggressors, and authors’ aim is mainly to extract possible patterns and risk factors. It has been used the technique of Data-mining Decision Trees (DT), which in this case allows the analysis in a very visual way the relationship between different variables and outcomes.

The authors have selected the most relevant variables to achieve the goals desired to study the type of aggression: drug use in the assault, use of objects or weapons, the presence of witnesses in aggression, nationality of the accused and his criminal records, using predictive models based on decision trees is presented and compared with multivariate analysis.

The architecture proposed is a High Performance Computing Cluster (HPCC). This kind of systems distributed data intensive open source computing platform and provides big data workflow management systems, and it build multikey and multivariate indexes on a Distributed File Systems.

**Keywords:** artificial intelligence, domestic violence
Telehealth for One Sixth of Humankind - Making it Happen: A 15 year Story from Apollo Hospitals
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Urban rural health divide is a major concern in India. Even with centres of medical excellence, 700 million Indians still have no direct access to secondary and tertiary care as 80% of India’s specialists, primarily cater to 20%. In 1999, the author among others foresaw that it could be possible, to extend the reach of urban doctors to suburban and rural India, virtually. This presentation traces the 15 year role of Apollo Hospitals as a catalyst in promoting telehealth in India, Simple VC, has escalated to deployment of software integrated with EMR, eHome Visits, international teleconsults, tele CME programmes, deployment of internet enabled peripheral medical devices, mHealth, promoting eHealth Literacy and multi centre Grand rounds. The world’s first VSAT enabled village hospital at Aragonda, was commissioned on March 24th 2000 by then US President Bill Clinton. Since then, with 135centres (15 overseas), 90,000 teleconsultations in 25 specialities, 200 presentations in regional, national and international conferences and 110 publications, Apollo Telemedicine is the largest and oldest multi speciality Telemedicine Network. Selected by the Government of India for the Pan African e Network and for providing telehealth to 5000 internet enabled villages and by the Himachal Pradesh Government to deploy telemedicine units at 16,000 ft., Apollo is fully engaged in PPP (Public Private Partnership). Cited in the European Atlas of Telemedicine History, selected as Global Best Practice Telemedicine case study by Columbia University, studied by Harvard MBA programme, winner of Asia Pacific HIMSS award etc., Apollo Telemedicine has enthused scores of organizations. Even the Prime Minister of India has announced that telemedicine will be incorporated in Healthcare. With exponential growth in ICT, a rural tele-density of 45%, quality, affordable, accessible health care to everyone, anytime, anywhere deploying telemedicine, will eventually happen. This profusely illustrated presentation will give an overview of the past, the present and the future. The trials, tribulations, challenges in introducing a radically different approach in an emerging economy will be highlighted.

Keywords: telemedicine in India, telemedicine &Apollo Hospital

eHealth Potential in Bringing Healthcare Closer To The Citizens and to the Community
P. Raeve
European Federation of Nurses Associations

In the way of changing Europe’s health systems, eHealth is bringing great potential in supporting professionals, patients, citizens and families to modernize healthcare systems. It is socially and
economically unsustainable to maintain the traditional medical vision and approaches of today's healthcare delivery, focused only on a disease and curative approach, while Europe needs different mechanisms to focus on preventive care, helping citizens remaining free from diseases and at the same time improve the caring, making it more personalised driven. Healthcare is shifting the focus to deliver person-centred care within sustainable integrated healthcare systems where multidisciplinary teams work in a common endeavour to promote health and well-being. As healthcare needs more local and global integration, education, communication and continuity of care are becoming key enablers for successful policy change and outcomes. Technology has understood that in order to establish integrated systems and bringing care closer to the citizens and the community, it is necessary to design ‘fit for practice’ continuity of care solutions in ICT. Those solutions must embrace the use of big data, clear communication and strong interdisciplinarity with the right skill mix among professionals and deployment actions with user’s empowerment. Nurses have a key role to play in this governance process.

e-Health and the European Society of Cardiology: Involvement and Examples: Telemonitoring of Cardiology Patients and Data Integration
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Working Group on e-Cardiology, European Society of Cardiology

The European Society of Cardiology, as one the world’s largest professional bodies, is involved in e-Health on many different levels. e-Health is a broad term encompassing the use of information and communication technologies (ICT) in the support of health and health-related activities. It can be subdivided into several domains, including: telemedicine and telecare; clinical information systems and data standardization; integrated regional and national networks; registries; mobile health (m-health); personalised health (p-health); big data.
A number of these domains are tackled in this project of integration of data of cardiology patients on telemonitoring and a clinical information system. Remote follow-up of implanted cardioverter defibrillators (ICDs) may offer a solution to the problem of overcrowded outpatient clinics, and may also be effective in detecting clinical events early. Data obtained from remote follow up systems, as developed by all major device companies, are stored in a central database system, operated and owned by the device company. Another example is that of heart failure patients, who are monitored remotely by having the patients send various data on their health status to a central database. A problem now arises that the patient’s clinical information is partly stored in the local electronic health record (EHR) system in the hospital, and partly in the remote monitoring database, which may potentially result in patient safety issues.
To overcome this problem, we have integrated the data from remote monitoring systems and of telemonitoring systems with our Cardiology Information System, based on international data standards, resulting in one integrated platform that contains all relevant data on the patient’s disease status.
**Connected Healthcare: Preparing the Future**  
E. Mahdavy  
European Affairs Manager, Orange Healthcare

As health systems undergo significant and fundamental transformation, two worlds are gradually, but inevitably, coming together: the healthcare world, which is increasingly challenged by financial, resource and demographic considerations, and the world of Information and Communication Technologies, whose transformational potential is no longer questioned.  
Connected healthcare is a result of these two worlds coming together; it is about facing, and overcoming, today’s challenges, and preparing new, sustainable healthcare delivery models for the future.

**What is Your Value in the Value Chain of Digital Health?**  
J. Wubbe  
EPPOSI

This presentation will address:
- EPPOSI - European Platform Patient Organizations, Science and Industry;
- The digital health steering group;
- HTA and HIA on value of the whole value chain;
- What value is searched for by the diverse stakeholders?
- What value has to be monitored to quantify that value?
- Medical Trials, Genomics Robotics Informatics Biometrics IP and Biobanks;
- Monitoring Frailty and literacy the phenotype patient dataset;
- Meeting of the Minds.

**eHealth, Women's Health and the Legal Framework For A Successful Clinical Program: A View from Across the Atlantic (US)**  
T. Lewis, E. Sandy  
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The incorporation of eHealth into the clinical specialty of Women's Health is one of the most important advances in remote medicine and is one of the most challenging fields from a legal/regulatory and clinical perspective. The populations in the US, EU and throughout the world face an ever growing shortage of qualified Women’s Health physicians, geographic barriers limiting traditional in-person visits, a multitude of complex clinical issues that are specific to Women’s Health and a fluid and often undeveloped set of legal rules for delivering quality Women's Health care via eHealth models.
The audience will be provided with an interactive presentation that outlines the primary legal and regulatory issues that surround the use of eHealth in the Women's Health clinical setting as well as examples of the successful use of clinical expertise and eHealth technology to support this very important clinical discipline that is vital to the world's female population. In addition, the presentation will include several examples of how eHealth has been successfully integrated into the community mission of a major international academic medical center's Women's Health clinical department. The presentation will be provided by legal and clinical professionals supporting an international academic medical center with a robust eHealth delivery platform that is centered on providing women and all patients with high quality, cost-effective clinical care via eHealth technology. The audience will gain a better understanding of several important legal, clinical and technology issues that have been successfully mastered to allow for high-quality Women's Health clinical services to be delivered throughout rural communities and regions by eHealth technology and tools.

**Keywords:** legal, women's health, eHealth

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**Telemedicine Deployment is not Rocket Science: It Will Work if the Critical Elements are in Place**

M. Lange  
EHTEL, Belgium

What is needed to deploy telemedicine? The right context, involvement of the key people, good planning and sound “running” of the process. The Momentum Blueprint offers critical success factors and performance indicators that help decision makers to scale up healthcare services from a distance through information technology. And it delivers a self-assessment toolkit that helps an organization determine whether it is “ready” for telemedicine deployment.

The Blueprint comes from the Momentum project, a three-year initiative of European eHealth stakeholder associations and competence centres that was co-funded by the European Commission. Although Momentum ended in January 2015, key experts and contributors to Momentum will remain available to provide support on how to use the Momentum toolkit, and can be contracted to help an organization or region deploy telemedicine and share their experience.

Telemedicine deployment is not rocket science: it will work if the critical elements are in place. The Blueprint distils the key learnings from the Momentum project: it can be used as a kind of cookbook or set of guidelines for doing telemedicine scale-up.

The final Momentum Blueprint builds on two earlier versions which were released in May 2014 and December 2014. The final version was substantially edited and abridged; the explanations and the order of the critical success factors were improved; and the self-assessment toolkit was added. The toolkit is a combination of the Telemedicine Readiness Self-Assessment Tool (TREAT) and Momentum’s critical success factors. Used under the right circumstances, the toolkit helps to gauge the level of readiness of an organization by way of a comprehensive questionnaire and a consultative workshop involving all stakeholders. It can ensure that the people in the organization share the vision of scaling-up and are committed to its success.

About the project: the Momentum project convened telemedicine experts and stakeholders from more than 20 organizations in Europe. The project ended in January 2015. The website and the Blueprint remain online. Key contributors are also committed to preserving the project legacy and to help other organizations in their own journey to scale. The project was funded as a thematic network
under the ICT Policy Support Programme (ICT PSP) as part of the Competitiveness and Innovation Programme of the European Commission. More information is at www.telemedicine-momentum.eu.
From A Green Field to a Telemedicine Service Supporting 400 Patients in One Year – The Slovenian Experience
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Until 2014 no home telemedicine (business-to-patient) service was available in Slovenia. Slovenian partners in an European R&D CIP PSP project United4Health (U4H), namely GH Slovenj Gradec (GH-SG) and Healthcare Centre (HC-Ravne) have been pioneering in the area by providing telemedical support to patients with Diabetes Mellitus type 2 (DM2) and/or patients having Congestive Heart Failure (CHF) in Carinthia region (100.000 inhabitants, 300 km²) covered by GH-SG. The project partners set-up technological and organizational infrastructure with a support of a subcontractor (MKS Ltd.), having expertise in telecare service provision. The U4H project service model was adopted as well as patient inclusion/exclusion criteria. The first patients were enrolled in April 2014 and their number has been increasing to 120 CHF and 280 DM2 patients at the end of 2014.

The patients receive telemedical support as a part of the existing healthcare system. The CHF patients measure daily their weight, blood pressure, heart rate and blood oxygen saturation. The DM2 patients measure weekly their whole blood sugar profile. Data are automatically sent from each measuring device to the patient’s mobile phone over Blue-tooth and further to a telemedicine centre in GH-SG hospital using mobile network.

The existing workflow process of patient treatment in the GH-SG hospital has been minimally adjusted to integrate the new telemedicine service. A new medical response scheme has been introduced that responds to requests for intervention generated by the telemedicine system that monitors the received data measured. Patients whose data exceeds their Personalised threshold values are contacted by the telemedicine centre staff to assure that data provided relate to their health condition. In case that an intervention is required the centre contacts a medical specialists that decides on further action – that is a change in therapy or an invitation for a visit to the hospital. Those patients receive by post a report on every change in the therapy.

The patients receiving the telemedical support are not charged for the service as it is a part of the U4H project. The national health (compulsory) insurance system is charged for the medical interventions and for glucometers strips.

The project partners have been working on establishing conditions to provide the service beyond the U4H project end in 2016.

Keywords: telemedicine service, CHF, diabetes, patient support, telemedical intervention
**Value-Based Healthcare in Russia: Implementation of Medical Biosensors**

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We present the results of scientifically based search for medical biosensors ready to implement in Russia. About 200 devices have been found, divided into 7 large groups: cardiac, cochlear, blood sugar control, gastrointestinal, nerve stimulators, sports and others. They mostly originate from the US companies, such as Medtronic, St. Jude Medical, and others. We discuss main trends of medical biosensors development, such as an attempt to create a universal device that can monitor a number of physiological parameters, or 3-D printing as a way to produce such device.

We also discuss socio-economic impact of medical biosensors development in Russia. Institutional peculiarities are shown to be the main obstacles in biosensors implementation. The Russian market for telemedicine is now 1-1.5% of the world (with the prospect of up to 3%), and it is very dependent on governmental policy. Thus the aim of experts’ community is to influence the authorities.

To promote the idea of telemedicine, we are developing for the Ministry of Health the concept of full cycle integrated project “Development of distant medical care”. The idea of the project is to turn to value-based healthcare. This involves: personal medicine using medical biosensors (preferably, universal ones); usage of mobile network to transmit the data; and formation of data center analysis. This project in its starting edge has the support of several state-owned banks. Some preliminary investigations to study the proposed mechanisms are now under way in several Russian regions. If successfully launched it would be implemented in 2016-2017 for the whole country with governmental funding of about 2 Bn euros. This work was supported by RFBR grant 13-02-12111.

Key words: telemedicine, medical biosensors, governmental program.

**CyMED: a Platform for Supporting Coordination and Scheduling of Home Care Teams Using a Process Oriented Approach**

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The aging populations, rising healthcare costs and increasing number of chronic diseases requiring long term care have been the major challenges of healthcare systems for the last decades. Nowadays, to handle this issue, more and more patients are treated and taken care of in their own homes. However delivering homecare services is not an easy task because of the large number of actors that participate in homecare processes, characterized by their mobility and their schedule variability. The main difficulty is then to synchronize human and material resources at patient’s home and avoid unwanted conflicts. Moreover, modern homecare propose new technological services (sensors, etc.) that also require coordination and collaboration with the services provided by human stakeholders via the exchange of data or the synchronization of actions. To handle these kinds of difficulties, we are developing a coordination platform called CyMED (Cyber Management of Elderly and the Disabled), which use a mix of scheduling and process oriented tools, in order to facilitate the cooperative work of health and social care actors. With this approach, we aim to highlight the importance of organizational aspects in the context of homecare.
In this paper we describe the Personalized scheduling service encapsulated in the CyMED platform which organizes the appointments and events of the patients and all the homecare participants. The planning service can also provide optimization functionalities if the users want to optimize their daily scheduling. In this case, several criteria are taken into account expressed in terms of: tasks and appointments ordering in care processes, unavailable or available time slots per type of service, maximum number of visits per day, availability per geographic areas, and distance between appointments' locations, etc. Such a service proposes schedules according to a horizontal dimension (sequencing of the tasks and appointments) and vertical dimension (optimal choice of people and means). There is an interaction between the planning engine, implemented on the constraint programming tool CHIP-V5, and the expert planner, who can adjust and verify the schedule.

**Keywords:** scheduling, homecare, coordination, constraint programming

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**Implementing Telemonitoring in the Portuguese National Health System**

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The Portuguese Ministry of Health has decided to increase telemedicine use and to implement telemonitoring use in the Portuguese National Health System. One of the ministry’s agencies, the Shared Services of the Ministry of Health (SPMS) designated a working group for the promotion of telemedicine, including telemonitoring. The group decided to use the Chronic Obstructive Pulmonary Disease telemonitoring as the implementation model with the objective of increasing patient care efficiency and quality, namely decreasing the number of decompensations and the associated need of emergency services use and the need to be admitted to the hospital all along with improvement in patient satisfaction regarding care process.

The project had one year duration. Using the opportunity to disseminate the telemedicine and telemonitoring concepts it was decided to implement the project in 5 different hospitals covering most of the Portuguese continental region (1 in Viana do Castelo, in the North, 1 in Coimbra, 1 in Covilhã, (both in the Central Part of Portugal) 1 in Portalegre (Alentejo) and 1 in Faro (Algarve). 5 different telemonitoring solutions from 5 different companies were selected, using the designated daily monitoring process with blood oxygen saturation, body temperature, weight and heart rate. Fifteen patients were included in each hospital (75 in global) and the project was funded by the Ministry of Health. Patients were selected by the hospital lung disease specialist between the patients with more severe disease and greater probability of decompensation. Each patient received the monitoring devices, a smartphone and a communication station. Data was analyzed in real time. The data generated was filtered using thresholds and whenever needed the care team intervened. The individual projects are going to finish in 2015 first semester. In the presentation we will present the details of the project and the interim results including satisfaction data.

**Keywords:** COPD, telemonitoring, care, national, efficiency
HealthAnalyst - Complex System for Medical Diagnostics and Therapy Monitoring
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The development of HealthAnalyst has started more than 20 years ago. From the beginning was the main goal a development of cognitive cluster analysis of several biochemical parameters. Later measurement of basic vital signs, like blood pressure, ECG, pulse etc., were also included. In the final stage the new gene expression patterns analysis was added in order to create “healthcare portrait” of given person. The HealthAnalyst has 3 basic software packages:

- BioAnalyst - module for evaluating of different laboratory parameters, especially biomarkers;
- CardioAnalyst - module for evaluating of plethysmography data;
- GeneAnalyst - module for advanced gene expression analysis.

This system was designed with “out of hospital” approach in mind, which is more and more used for cutting unnecessary enormous hospital costs, ruining actually almost all national healthcare systems in many, even developed countries. From these reasons the main application of HealthAnalyst is based on remote communication with 24/7 internet servers. Complete application of these modules on tested person allows defining an actual above mentioned “healthcare portrait” and sending “disease warning message” within a few minutes. System HealthAnalyst is not intended as a substitute of a physician, but as his sophisticated tool. Although this system was clinically tested on several thousand persons, the other clinical tests are necessary. Negotiation of cooperation with several top Czech and European hospitals and medical companies has as early as started.

Keywords: biochemical data, cluster analysis, genes

Development of a Multi-Pathology Domomedicine Platform Based On A Collaborative Design
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The aging populations, rising healthcare costs and increasing number of chronic diseases requiring long term care have been the major challenges of healthcare systems for the last decades. They call for the development of a new patient-centered health care system, with original specifications dedicated to long term multipathology and multiactor management of individual patients suffering from an array of chronic diseases. Such multi-user, multi-pathology, integrated and patient-centered model of care has been proposed as Domomedicine by the French Academy of Technology. The goal is to group acts and care, including social services, given to the patient at his home or in his social and professional activities, at least comparable in quantity and quality to those made in the hospital, sometimes complex, supported by ICT systems and services, and including for example telemedicine.
Designing such systems is complex as it requires integrating medical, scientific, social, regulatory and technical aspects to achieve optimal outcomes.
In this contribution, we propose to review operational steps in the conception process taking into consideration requirements of the different stakeholders. This review is based on our experience in a French multi-partner project which aims to design and develop a multi-pathology Domomedicine system and to assess it on a pilot scale. In this project, we developed a platform adapted to home monitoring of patients with cancer and patients suffering from Alzheimer’s disease, including the possibility to manage comorbidities such as malnutrition. Such a collaborative design aims at: i/ being as closer as possible to the future users’ needs, and ii/ anticipate the integration of other monitoring devices for the follow-up of other chronic diseases.

**Keywords**: e-health, Domomedicine, design

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**The FOG: Small Data on Health Cloud**
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2Supercomputer Centre, Barcelona, Spain
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Health 4.0 applications in the IoE (Internet of Everything) framework generate and use both “Small Data”, and “Big Data”. “Small Data” should be processed in the Fog, which is an extension of the Cloud to the edge of the network (close to the IoT devices that stream private health-related information). Processing and storing Small Data close to the sources has enables tighter control of the data ownership, response time, and semi-autonomy require by critical applications.

**Keywords**: Fog, cloud, eHealth, IoT, small data

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**Telemonitoring Home Program in Patients with Cystic Fibrosis: Results after 10 Years**
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We studied the effect of Telehomecare (THC) in a group of Cystic Fibrosis (CF) patients. Fev1 was monitored at home, in the aim to early recognize the relapses of pulmonary infections. Data obtained with Spirotel® instrumentation were collected from 2010 to 2014. The study has involved 16 patients (11 female, 5 male) affected by CF, followed at our Unit with THC in addition to the usual therapeutic protocol, for a period of 4,5 years. As controls, the study has involved 16 patients affected by CF treated at our Unit (9 female, 7 male) for the same period, with similar characteristics of age, degree of pulmonary involvement, bacterial colonization and O2 dependency. The annual mean values of Fev1 were calculated in both groups.
Results show a statistically significant improved outcome in THC patients toward controls (p=0,002). The trend of both quantitative and qualitative parameters of our work is positive. The data are encouraging with regard to the possible role of Telemedicine in the organization of homecare of
chronic diseases. In the current state, however, reliable data on the long-term effectiveness of the use of Telehomecare in CF are lacking. Data on the real long-term effectiveness of the use of Telehomecare in CF can only be obtained through a multicentric study, for which appear the time to be ripe to format.

**Keywords**: telemedicine, telehomecare, cystic fibrosis

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**Interoperability for Home Healthcare and Remote Patient Monitoring**

C. Parisot  
GE Healthcare

Placing monitoring devices in a patient home to deliver healthcare via remote monitoring is a promising approach for which standards are critical in order to ensure a robust and easy interoperability with the care facility from which care is being supervised. This presentation will explain how IHE and Continua have collaborated to ensure an end-to-end approach to plug and play and consistency with intra-hospital solutions are compatible. This presentation will review the available IHE Profiles that offer the necessary building blocks of interoperability. Some practical examples will be reviewed.

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**Telemedical Monitoring of People Using Fruit and Vegetable Diet**

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²Institute of Health Mielno\Uniescie, Poland

People staying on a rehabilitation turns at the Institute of Health in Mielno-Unieście were monitored using a high signal resolution pulseoximetry (HSR-PW). In order to determine the changes in the circulatory system caused by the fruit and vegetable diet, pulse wave and ECG records were monitored using telemedical system MONTE (www.monte.net.pl). The distance between the examination site and the server location on which the results were analyzed was 300 km. HSR-PW method is based on increasing the resolution of standard pulse wave signal in which to increase resolution of this pulse wave the linear transformation method is used. This procedure allows obtaining more detailed structure and analysis of received pulse wave signal. In contrast to the results of a standard measurement, HSR-PW allows observe even minor changes in the circulatory system. The study involved fifty patients in the age of 55 – 80 years. A standard CMS-50E digital pulse oximeter localized on the left hand index finger was used. The standard pulse wave has been recorded, transferred by the Internet to the analytical server and the HSR-PW analysis has been performed. Each patient was performed three tests: at the beginning of staying, after 7 days and after 14 days. At the same time, the level of urea, potassium, sodium and other electrolytes was controlled. There were significant changes in HSR pulse wave parameters, such as the parameter that describes the ratio of the volume of the ventricle to aorta and parameter characterizing vascular resistance of the circulatory system. The majority of patients had a significant improvement in these parameters.
after 7 days of diet. Telemedical monitoring of basic parameters like oxygen saturation and changes in the cardiovascular system is useful in assessing the efficacy of the diet treatment.

**Keywords:** telemonitoring, pulse wave, oximetry, diet

**Approaches to the Selection of Hardware for Teleconsultations and Remote Monitoring of Health of Far North Population**

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The framework of implementation of the Russian-Norwegian project "Quality improvement of medical care of the indigenous population of the Nenets Autonomous district" includes activities aimed at the implementation of the system of examination of patients in remote communities of the Nenets Autonomous Okrug. The acquisition of two hardware/software modules for remote special events of medical examination was planned.

The stage of testing revealed that this equipment does not meet the needs of the project and requires revision. In order to identify alternative hardware/software module and list of equipment, possible to implement in the framework of the project, specific requirements were formulated. We have defined goals, objectives, and general requirements for equipment and conclusion formation. Besides that, we have elaborated arrangements for the remote telemedicine assistance in the field of cardiology. We have done the analysis of the equipment of regional healthcare organizations. As a result, proposals for improving the quality of medical cardiological care of the indigenous population of the Nenets Autonomous Okrug in remote settlements were developed.

In the frames of the project were purchased 3 sets of equipment (CaoguChek XSPlus, Schiller CardiovitAT - 102) which were installed in the most remote and isolated settlements of the Nenets Autonomous Okrug - Nes, Karataika, Bugrino. Moreover medical personnel were trained to work with this equipment. Currently we improve the skills of collaboration between health organizations in the field of transport of data, conducting telemedicine consultations in the provision of medical care for Acute Coronary Syndrome. After testing this organizational decision can be proposed for use in medical institutions in other regions.

**Keywords:** equipment, telemedicine, approaches, NAO

**Design of a Technological Solution for the Analysis of Sleep Quality Using Biomedical Signals**

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Between 15% and 30% of the population suffer sleep disorders. This fact affects to people quality of life and daily habits. The most common diagnosing methods are: polysomnography, respiratory polygraphy, the multiple sleep latency test, the maintenance of wakefulness test, video-EEG monitoring of sleep, actigraphy, oximetry and photoplethysmography.

In this research work the authors use some biological signals to analyze sleep quality. The main objective is to design and develop a technological solution to analyze sleep quality in order to find possible disorders during rest. To achieve the proposed objective, electrooculogram (EOG) signals, skin conductance (GSR), air flow (AS) and body temperature are processed, and a quantitative analysis is performed of the significant changes and agreement between them occurring in a forthcoming time interval. Filtering techniques has been used such as the Fourier transform and IIR filters to process the signal and so obtain the significant events. Once such changes have been obtained, a comparison is made of all the significant data and a quantitative and statistical analysis is carried out determining the level of a person’s rest.

As for the results, changes in common have been obtained on up to 158 occasions. Moreover, by means of statistical calculation, a total of 11 significant changes in common (p > 0.05) have been found. Finally, an appropriate diagnosis can be made, and the evolution of the possible treatment applied by medical experts is monitored.

**Keywords:** EOG; GSR; AS; sleep quality
Test results are sent out electronically to health-care workers without the patient knowing the results in order to avoid self-diagnosis. These results are accessed via a website and are stored in the databases of the health centers.

Keywords: Teletest, health parameters, immunochromatographic detection

eConsultation Characteristics
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Background: Mayo Clinic offers econsultations with specialty providers. eConsults are driven by automatic clinical processes as well as by provider request and can be requested for a variety of reasons. Our aim is to review and categorize the econsultations at our institution.

Methods: We obtained all econsults from January 1, 2013 through June 30 2013 and randomized 360 to review and categorize for the reason for the econsult. Categorizations were not mutually exclusive; econsults could have more than one category coded.

Results: There were 3,008 econsults performed between January 1, 2013 and June 30, 2013. The specialties of Hematology 349 (11.6%), Gastroenterology 343 (11.4%), Endocrinology 301 (10%), Nephrology 240 (7.9%) and Cardiology 238 (7.9%) were the specialties with the highest number of econsults. Upon review of the 360 randomized econsults, the greatest number of econsults were in regards to management questions 119 (33.1%), image results 91 (25.2%), lab results 83 (23.1%), diagnosis questions 61 (16.9%) and further test selection questions 52 (14.4%). Six (1.7%) of econsults were in regards to a physical exam finding. A face to face consultation was recommended by the econsult specialist 49 (13.6%) of the time. It was noted by the econsult specialist that insufficient data was available for the econsult 23 (6.4%) of the time.

Conclusions: eConsults at our institution are primarily for questions related to management and test results. A face to face visit is recommended by econsulting specialists a minimum of the time. Insufficient data is cited as a concern by the econsulting specialist infrequently.

Keywords: econsultation, e-consultation

3ECare Concept
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Technology is now ready to provide telemedical solutions in the most isolated areas. In November 2014, IFREMMONT tested this system on 10 high altitude runners in Nepal. So every day the medical team in Chamonix has remote monitoring (12/24 monitoring) of biomedical parameters of these 10 peoples. Bases on an Android platform, these new kinds of tools bring a new hope for isolated and poor people. In this paper we present the results of the high altitude test and announce how this technology will be available on a free service. Beyond this technological point of view, we show how
the remote monitoring of these parameters has predicted the occurrence of two case of severe acute mountain sickness. So now with the 3ECare sensor, you have a doctor in your pocket...

**Keywords:** personal, mobility, telemedicine system, isolated

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**MyHealthBox: The Concept**

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MyHealthBox is the 1st nomadic professional kit for telesurveillance among which post ambulatory surgery monitoring and home support programs. It gathers BewellConnect medical grade devices: a non-contact thermometer, a blood pressure monitor, a scale, a glucometer and an oximeter... anything you need to measure your vitals. The devices are directly integrated into a new gateway “Pops”, developed in collaboration with Orange, centralizing the data without any smart phone, nor Wi-Fi, nor box, a minima a GSM coverage is required. All the information gathered from the Bewell Connect devices is automatically and securely transferred to your healthcare professional. This day to day monitoring leads to possible early detection of predictive threshold, through which medical doctors can anticipate the needs for therapeutic adaptation. This early detection process revolutionizes both economic and clinic healthcare performance, bringing full legitimacy to MyHealthBox.
The Benefits of Telemedicine Application in the Middle East: Hashemite Kingdom of Jordan

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We investigated the benefits that the adoption of telemedicine has provided to the Middle Eastern countries and the Hashemite Kingdom of Jordan in particular. In order to obtain data, we sought opinions from all perceived key stakeholders, 90 semi-structured interviews were conducted with doctors, technicians, engineers, and decision makers, and 110 questionnaires were distributed to further key stakeholders including patients to ensure that we gained opinion from people from all relevant backgrounds. In addition, visits to various hospitals and clinics were made in order to make direct observations.

We found that there has been significant use of telemedicine in parts of the Middle East and there have been benefits gained. This was found to be especially the case in Jordan, where telemedicine has proven to save time and cost, bridge the distance gap, facilitate second opinion and overcome the lack of training by providing continuing education and training courses.

Keywords: telemedicine, eHealth, Middle East, Jordan

An Evaluation of a Facebook Intervention for Rural Midwives in South Africa

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As part of a strategy to address the Millennium Development goals to improve child and maternal health, rural-based Registered Midwives are currently enrolled in an Advanced Midwifery course through the University of KwaZulu-Natal, South Africa. To facilitate access to the course while remaining in their home and work environments, a blended educational program was designed. The two-year program includes weekly in-person videoconference-based lectures broadcasted to students at the rural hospitals.

The aims of this study were to measure the use of mobile phones and social network sites; to determine the feasibility of using social and mobile media for formal education; and to implement a social media educational intervention to support the midwives in a course requirement to conduct a group research project. A quantitative survey was conducted to collect data on mobile phone and social network use, the learning environment and students’ attitudes towards the use of mobile and
social media for educational purposes. Subsequently, a Research Facebook Group was established for second year students to assist them to develop a two-page research proposal project plan. Fifty seven students (68.8%) completed the survey. Mobile phones were used most often, though not for education purposes. Social media uses were lower with 38.2% reported ever having used Facebook. Though perceived competences in technology and social media were low, students reported that it could greatly improve their learning but that technology support in the local areas was low. The Research Facebook Group was established by a project officer personally visiting each site. Once established the Group was conducted over 4 months in 2013. All second year students (47) enrolled in the Facebook Group. The analysis yielded intensive participation and rich forms of mentoring activities enabled by the media-mix and all student groups submitting feasible research project plans. There is great potential to use social media and mobile phones to facilitate learning, but any educational activity should be accompanied with appropriate technical and educational support.

**Keywords:** mobile phone, social media, nursing

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**The National Pseudonymisation Service of Luxembourg**

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Medical data of persons that is collected in the context of medical treatment or of clinical trials and studies is highly valuable information that must be protected against illegal access or misuse. Beside the strict enforcement of access control or the use of encrypting techniques, pseudonymisation of medical data is another useful tool to protect sensitive data. The demand for pseudonymisation services has been strong by key players in Luxembourg in the past. The Agence eSanté of Luxembourg, which is responsible for the setup of a nationwide eHealth platform, has therefore commissioned the installation of a National Pseudonymisation Service that is now up-and-running. The National Pseudonymisation Service of Luxembourg supports a variety of use cases that require pseudonymisation. It mainly acts as a translator of demographics, local identifiers and pseudonyms. Each identifier or pseudonym belongs to isolated identifier domains. Strict enforcement of permissions on base of certificates ensures that only information from identifier domains can be seen by systems for which it is registered. Permissions are only set by authorized personal of the National Pseudonymisation Service on base of validated security concepts. Since the National Pseudonymisation Service of Luxembourg relies on the existence of the National Patient Register of Luxembourg, all identity management related problems are already solved on national level. In cases of revises decisions (e.g., update of demographics leads to a different identification of the person in the Master Patient Index), the National Pseudonymisation Service provides mechanisms to manage these decisions without leaving data of the research databases in an undefined state.

**Keywords:** national pseudonymisation, privacy, local identifier
How Telemedicine Shortens Distances in Mali
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In Mali, health personnel are poorly spread between the capital and other regions. More than half of the socio-sanitary staff is situated in Bamako. It is further characterized by a shortage of health specialists, particularly in the regions. In 2005, a tele-medicine programme (IKON) was set up in Mali to overcome the lack of specialist medical expertise in rural areas. IKON was implemented by Dutch NGO IICD together with CERTES, a Malian medical research organization with operations at the University Hospital ‘Point G’ in Bamako, and the Malian society for radiology SOMIM. During the pilot (2005-2006) equipment was installed in Point G and 3 regional hospitals allowing rural doctors to share images and patient information in a secure online environment with radiologists in Point G for peer consultation. Four more regional hospitals were linked up in 2007 and a private clinic in 2012.

Between 2005 and 2013, 5,628 X-ray and mammogram images were read remotely through the telemedicine platform. As of 2011, the services are fully paid for by the hospitals in need of the service.

In 2013/2014 a research was conducted to find out to what extent the telemedicine service had increased the rural doctors’ diagnostic ability. Data was analyzed for the years 2005-2013. For each scan, the data, patient’s unique code, hospital, priority, sex, age and the concordance of the doctors’ diagnosis and radiologists’ diagnosis was obtained. For 2012-2013 also the scan type, the doctor’s diagnosis, radiologists’ diagnosis and the time taken for the diagnosis was obtained and analyzed. Additionally, interviews were carried out with all health staff involved.

The study concluded that IKON presents a new model of implementing tele-medicine in a developing context, which moves away from cross-border medicine and towards developing in-country expertise networks. The study showed that the use of tele-radiology contributed to:

- Improvement of the regional doctors’ diagnostic ability;
- Improvement of the prescribed treatment;
- Reduction of the need for patients to travel;
- Reduction of professional isolation for regional doctors;
- Improved learning opportunities for regional doctors.

**Keywords:** Mali, telemedicine, radiology, sustainability, accessibility

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Telemedicine Network in the Nenets Autonomous Okrug - New Perspectives
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The Nenets Autonomous Okrug is located in the extreme North-East of the European part of the Russian Federation in difficult climatic and geographical conditions. The remoteness of settlements from the regional center, the absence of ground transportation, irregular air transportation render difficult quality health care for population of the Nenets Autonomous Okrug. Under these conditions, telemedicine is an effective tool in providing medical care to the population.

In 2000 in the Nenets Regional Hospital was established Department of telemedicine, implemented videoconferencing (annually about 600 consultations and 15-25 video conferencing). In 2011 was created telemedicine network of the Nenets Autonomous Okrug which unites 15 remote settlements. This allowed performing remote monitoring of pregnant women from settlements of the district. In 2013 Nenets Regional Hospital start participation in Russian-Norwegian project "Quality improvement of medical care of the indigenous population of the Nenets Autonomous Okrug". In the frames of the project in 2014 in Naryan-Mar was held an international scientific-practical conference “Arctic Telemedicine”.

Prospects for further development of telemedicine in the Nenets Autonomous Okrug:

- Connection to the telemedicine network regional rural health post;
- Providing telemedicine services to oil extracting companies;
- Implementation of remote health status monitoring for children in the first year of life;
- Improvement the quality and availability of medical care to the population by conducting a medical examination with the use of remote sensing technology;
- Realization of the program of acute coronary syndrome medical care with remote consultation and timely thrombolytic therapy in the medical institutions of the remote settlements.

Further development of telemedicine requires the joint efforts of authorities, public health officials, experts on telemedicine, and health workers.

Keywords: telemedicine, network, NAO, perspectives
case of complex patients to remote interpretation of pre-transfusion and prenatal tests for all routine patients.
The TM service is organized 24/7 and is used in 9 dislocated transfusion laboratories when a TMD is
not available. After receiving a request for blood components, the laboratory personnel perform the
obligatory pre-transfusion tests in gel cards and create a TM session with captured images of the
cards for each patient. The sessions are sent to a teleconsultant, a TMD working on the other location,
who is responsible for several remote transfusion laboratories (7 or 2) at the same time. After
interpretation and validation, the test results are issued with the electronic signature. Since the
implementation of TM, the number of sessions increased from 290 sessions in 2008 to 21,220 in 2014.
The use of TM has a strong impact on the improved and timely transfusion service for patients,
improved relationship between BTS and hospitals, improved organization and rationalization of work
in BTS and on substantial cost savings. TM allows pre-transfusion tests all over the state to be
interpreted by TMDs 24/7. Consequently, increased patient’s safety is expected and the same quality
of service for all the patients regardless of time and location is provided. So far, the TM system has
proved to be reliable and secure and has been highly appreciated by its users.

Keywords: telemedicine, remote interpretation, teleconsultation, transfusion

Telemedicine in the Public Sector in South Africa – An Overview
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The South African eHealth Strategy 2012–2016 aims to support the proposed National Health
Insurance and includes telemedicine to improve healthcare delivery in rural and underserved areas.
The last audit of telemedicine infrastructure in the public sector was in 2008 and reported 86
telemedicine sites of which 32 were active.
The aim of this study was to assess the state of telemedicine in public sector in South Africa.
Methods: A questionnaire addressing telemedicine infrastructure, administration, management,
services offered and their use, was sent to people identified by the National Department of Health
(DOH) as being either responsible for or leading telemedicine in each of the nine provinces. The
annual reports, performance plans and strategic plans of the nine Provincial DOH were reviewed. In
addition a literature review was undertaken of telemedicine in South Africa. Searches of PubMed,
Scopus, CINAHL, African Journals online and African Index Medicus were conducted.
Results: Only four Provinces completed the surveys. In two Provinces the persons identified felt that
they were not responsible and were unable to direct the survey to a relevant person. No responses
were obtained from three Provinces. Few departments budget for telemedicine or provide posts to
manage it and no data on telemedicine use were reported. Of 470 publications found between 1978
to November 2013, 44 reported telemedicine activity in the public sector. Telemedicine services
currently provided are: radiology, pathology, dermatology, psychiatry, ophthalmology, orthopaedic
surgery, audiology, paediatrics, trauma, tele-ECG, telespirometry, teleconsultation and occupational
therapy. Teleradiology is used in all Provinces. In total, 131 of 433 public hospitals and 148 of 3075
public clinics reportedly have telemedicine infrastructure in place or being installed.
Conclusions: Telemedicine activity in the public sector is growing but is fragmented and few Provincial DOHs budget for telemedicine or provide posts to manage it. There is a general lack of leadership in telemedicine and urgent need to finalize guidelines for telemedicine practice in South Africa.

**Keywords:** telemedicine, South Africa, literature review
m / eHealth in Europe – The Pharmacy Perspective
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The Pharmaceutical Group of the European Union (PGEU) represents over 400,000 pharmacists from 34 European countries and aims to advance the contribution of community pharmacists to European health systems, society and individual patients. In this newly created and dedicated pharmacy / pharmacist session at Med-e-Tel, the PGEU aims to present the PGEU’s position on m/eHealth and provide a brief overview of a selection of mHealth and eHealth initiatives driven by pharmacy / pharmacists. This dedicated session is also intended to encourage other speakers to present their experiences related to pharmacy / pharmacists and foster collaboration between pharmacists, industry and patients.

The presentation outlines the key findings from the PGEU’s response to the European Commission's Green Paper on mHealth published in 2014 in that (when concerning m/eHealth); data protection is paramount, regulation of big data is necessary, a guidelines-based approach should be used to enable users and healthcare professionals distinguish between lifestyle apps and bona-fide medical apps, a certified review process demonstrating safety and efficacy for medical apps is needed and the use of m/eHealth initiatives should not replace face-to-face consultations but should complement them. Additionally, the findings call for the need for community pharmacists to be consulted during development of such apps and initiatives. The presentation also outlines several initiatives taking place across Europe by PGEU member associations such as: the Belgian and French “Dossier Pharmaceutique” electronic patient medication records; the Obervia, DO-Pill and Telemedinov initiatives in France; the Adhierête and BOT PLUS 2.0 projects in Spain; the IFarmácias app in Portugal and the Medicines Use Review and New Medicines Services in England. The presentation points out the recent evaluation of several of these services and calls for similar initiatives created in the future which are deemed clinically and cost effective to be a reimbursable and fully financed pharmacy service. Finally, the author calls for collaboration between pharmacists, industry and patients.

Keywords: pharmacy, pharmacist, e-pharma, telepharmacy, PGEU

m-Health Tools Supporting Pharmacists’ Key Roles: Selected Examples from around The Globe
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International Pharmaceutical Federation (FIP), The Netherlands

The International Pharmaceutical Federation (FIP) represents over three million pharmacists and pharmaceutical scientists worldwide. It encourages pharmacists’ associations around the world
(including its 132 national membership organizations) to take an even more prominent role in using mobile technologies, via m-health tools, to support the key roles of pharmacists in responding to people’s needs of optimal, evidence-based care. As defined in the Joint World Health Organization (WHO)-FIP Guidelines on Good Pharmacy Practice: Standard for Quality of Pharmacy Services (2011, available at: www.fip.org/good_pharmacy_practice), these roles are to:

- Prepare, obtain, store, secure, distribute, administer, dispense and dispose of medical products (Role 1);
- Provide effective medication therapy management (Role 2);
- Maintain and improve professional performance (Role 3);
- Contribute to improve effectiveness of the health-care system and public health (Role 4).

This presentation will describe selected m-health tools that support pharmacists in these roles. It will focus on the counties from all over the world, outside Europe. The tools have been developed or endorsed by pharmacists associations, including the Pharmacy Guild of Australia, American Society of Health-System Pharmacists, Canadian Pharmacists Association, Pharmaceutical Society of Kenya, Pharmaceutical Society of Ghana, Pharmaceutical Society of Nigeria, National Chamber of Pharmacists in Senegal, National Chamber of Pharmacists in Burkina Faso, the Korean Pharmaceutical Association, as well as by the World Health Professions Alliance (of which FIP is a founding member).

Keywords: pharmacist, pharmacy, health promotion, adherence,
endpoint is the change in the Morisky Medical Adherence score with respect to baseline. The expected results are an improvement in the management of disease treatment and an increase in medication adherence; a rise in the satisfaction and acceptability of the monitoring service. The study will be conducted in collaboration with Department of Public Health, Experimental and Forensic Medicine of University of Pavia.

**Keywords:** adherence, IVRS, pharmacy, monitoring, interactive

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**Netcare: Videoconsultation In Swiss Pharmacies: An Example Where IT Facilitated Collaborative Practice**

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Netcare started in April 2012 in 200 Swiss pharmacies. Specially educated pharmacists have the possibility to triage the patient following one of the 24 decision trees elaborated by pharmacists and doctors. The result of the triage can lead the patient to be treated by the pharmacist (OTC drugs), to be sent to a practitioner or to be put in contact through video with a telemedicine doctor who can also send a prescription to the pharmacy, if needed. A follow-up is done after 3 days to evaluate if the treatment is efficient. The pharmacists are completing a standardized questionnaire about each triage for study purpose to prove the efficiency, safety and efficacy of netCare. After 2 years, approximately 4500 questionnaires were filled and 900 videoconsultations realized. All algorithms are used, especially cystitis and conjunctivitis. Netcare is a perfect addition to today’s primary care for the following reasons:

- High availability – no appointment required;
- Better use of the existing pharmacy infrastructure;
- Quick, secure access to competent first and structured triage;
- Can optimize costs due to the pharmacist’s triage preventing unnecessary ER visits;
- Can improve primary care where shortage of family physicians is most visible.

Limitations - the implementation of the service is difficult: only 72% of the trained pharmacies are offering the service. A coaching is necessary. To fully estimate the potential of netCare, the pharmacist should be allowed to dispense the prescription drugs defined in the decision trees. A study was realized to show the efficiency, safety and economicity of the service.

**Keywords:** netCare, videoconsultation, Swiss pharmacies

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**ePrescription and EHR: A Synergic Strategy to Provide a Wide Range of Services for the Citizens**

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The introduction of e-prescribing has already led to a systematic change in the organizational processes of the Veneto Region healthcare system. For both specialistic and pharmaceutical
prescriptions, the digitalization of these documents has made it necessary to manage their life cycle and the steps related to their work flow. In the first phase GPs and Paediatricians were involved, subsequently also the pharmacies, that are key players in this cycle prescriptive because they administer the steps ranging from the distribution of the drug to reporting to the local health authorities and the Ministry of Economy and Finance. Through the communication network between regional management system (SAR) and national system, the e-prescribing/e-referral softwares will be able to send structured XML electronic with prescribing and dispensing data embedded, whose data are collected and processed by the SAR using international standard structured data as HL7 XML CDA2, as standard clinical document format for EHR. The prescribing management cycle uses international IHE profiles as XDS.b Cross-Enterprise Document Sharing and XDW Cross-Enterprise Document Workflow. The technological synergy that has been created within the infrastructure allows achieving the integrated care approach. On top of this, the opportunities are shared among all the actors which are involved in the process. Moreover the interoperable infrastructure of the regional EHR will provide the background and the tools in which the developments of health app, smart alert, digital TV channels or applications and any telemedicine solution are made possible. The main outcomes till now are based on the wide involvement of healthcare professionals (more than 1.000 taking part into the working groups) that are activating co-production paths inside the regional healthcare system. During 2014 the project guaranteed to achieve the e-prescription thanks to the network among GPs, pharmacies, regional health information systems and the Ministry of Finance. In the last 3 months of 2014 more than 8 million of e-prescriptions have been managed by the system, which are 86,8% of the total amount.

Keywords: ePrescription, EHR, IHE, telemedicine, interoperability

European Pharmaceutical Students' Association perspective on mHealth
L. Besson
European Pharmaceutical Students' Association, Brussels, Belgium

The current pharmacy students are from the Y generation which has had constant access to information technology in their youth. eHealth or mobile Health is a topic they know conscientiously or not. The European Pharmaceutical Students' Association has identified the importance of the topic of mHealth already several years ago, and since than mHealth has been brought higher on our agenda. The recent milestones were the panel discussion on this topic arranged during EPSA Annual Reception 2014, the survey to EPSA members on the topic and the response to the European Commission Green paper which previous actions have led to. The students are already experienced with technology and are ready to improve its presence in health but it is not without certain concerns and prerequisites. The presentation will cover the students’ perspective on the topic, in regards of both education and professional use. We will present the results of our survey, the outcomes of our panel discussion and the students’ recommendation on mHealth.

Keywords: pharmacy students’ perspective mHealth
Digitalcare Farma: A New Approach to the Pharmaceutical Care
R. Tobia
Federfama International Affairs Delegate, Italy

Since 2009 in Italy became crystal clear how the approach to healthcare should radically change its paradigm. The scarcity of economic resources showed as the pivot of healthcare could not be only the hospital. The new password began to be “dehospitalization”, in other words, the shift from the hospital to the community not only for many minor diseases but even and mainly for prevention and its fundamental role inside primary care services.

This was translated in some law provisions highlighting the new role of community pharmacies in providing the so-called new pharmacy services, even though public budget for these services had to be found inside the national health fund.

After some years of delay in finding an agreement in order to find public money to finance these new pharmacy activities, Federfarma decided to begin in offering some new services initially at complete patients charge.

We started to create an IT platform named Digitalcare Farma and linked to Federfarma web portal in order to provide to all Federfarma members a complete and turnkey tool able to open the way for new services to be offered to their patients.

Digitalcare Farma is conceived both as a national brand identifying the pharmacy network and a future new point of access at National Health Service.

My presentation will give to all participants a clear overview of this project, this will include the technical and professional tools at pharmacy disposal, the real advantages both for pharmacy network and for the entire healthcare system.

I will explain the concrete features of the already launched telemedicine service, and all the steps made in order to launch, in the coming months, the electronic platform keeping in touch health professionals and healthcare facilities with the aim to build-up an integrated approach of healthcare for all Italian patients.

Finally we will focus our attention to the last project in progress based on the compliance and adherence to therapy to be developed thank to the new tool of electronic pharmaceutical records soon at disposal of all community pharmacies.

Keywords: Dehospitalization, digital care, telemedicine, integrated care, compliance.

An IT-Solution for Public Display of Stock Levels in Swedish Pharmacies
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In Sweden from 1971 until 2009 there was a monopoly on the pharmacy market. Around the new millennium, Apoteket AB, had an IT-system for dispensing that enabled one pharmacy to see what the stock level was in another pharmacy, a characteristic that helped customers, health care personnel and pharmacy staff.

In 2010, the market was de-regulated in order to achieve a number of predefined goals:

• Increased availability to medicines;
- Improved customer experiences;
- Improved health care services;
- Maintain pharmacies contribution to safe drug usage

Even though, the number of pharmacies has proliferated since the de-regulation, meeting the first and second goal, the perception of some customers was that there were better stock levels prior to the de-regulation. In addition, the previous, characteristic of the dispensing system with nationwide visibility of pharmacy stock levels (for pharmacies) got lost in the evolution of multiple dispensing systems.

A gentlemen’s agreement for the pharmacy market was established in 2010 through the Swedish Pharmacy Association, stating that “a pharmacy should help his/her customer find the medicines if the pharmacy is out.” It partly alleviated the problem, and as per the 2014 it’s also regulated in law. In 2013, the Swedish Pharmacy Association and LIF (the research based Pharmaceutical Industry) started an initiative to make pharmacy stock levels visible for the health care, pharmacy and the public. It resulted in an IT-solution that was launched in May 2014. It’s reachable through trusted internet channels (LIF.se and Sverigesapotek.se) and enables a person to access a pharmacy online and see updated nationwide stock levels in almost all (99%) of Sweden’s pharmacies. It also employs geo-positioning in the mobile version, resulting in smart adaptive responses to its user so that one can see the stock level in the nearest open pharmacy.

Today, there’s nearly 15 000 items that can be dispensed via a prescription in Sweden. Every pharmacy strives to have an optimal inventory and a Swedish pharmacy has in average 3000-4000 items in stock. This yields a level of direct dispensing for 95% of the customers. For those 5% that have unusual medicines, there’s now an IT-solution in place so that one on beforehand can see which pharmacy that has which item in stock.

Key words: IT-solution, stock-level, dispensing system, mobile aid

Smart Technologies in Disease Management - What Do Patients Think?
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UK has an aging population with more than 15 million people suffering from long term conditions including chronic obstructive pulmonary disease (COPD) and cancers. Technology such as telehealth, m-Health and wearable technology can play an important role in disease management. This study aimed to evaluate patients’ perceptions of telehealth /m-health disease management systems.

Cancer patients and survivors (14) were recruited from Macmillan Cancer Voices network. One to one interviews were conducted exploring views regarding a mobile health application CanADVICE+® which monitors patients’ side effects providing real time advice. A survey of 27 COPD patients from a South London NHS Trust followed by a focus group (10) was conducted to assess perceptions about telehealth in general and smart wearables (vest) in particular. Both studies were approved by the academic institute ethics committee. Cancer patients would use the application for advice, information and reporting side effects, “I think I’d have used it”, “it’s good to use it on an emergency basis you know to make them aware that you need some extra help”. COPD patients were very satisfied with telehealth services. They agreed that telehealth had improved their health, it was a convenient form of health care delivery making them more involved in healthcare decisions. It also
increased patients’ confidence in managing their health from somewhat confident to confident. One patient said; “I am happy with telehealth because I am confident that I can be understood without feeling embarrassed”.

Potential telehealth benefits included; support for decision making in terms of seeking help, reducing need to travel to see a healthcare professional (HCP) and the sense of safety. With regards to a smart wearable vest, patients described this as “brilliant and creative”. All patients were willing to wear it, as long as it is light in weight, breathable and non-irritant. Patients were happy to receive alerts if abnormal results were detected and to take actions. Patients are receptive to use smart technology and are happy to engage in it as it provides decision making assurance about their healthcare.

**Keywords**: chronic, telehealth, m-health, wearables, patients

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**A Brief Report on the Application of Telepharmacy in Pharmaceutical Care**

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Pharmaceutical Care (PC) is a practice prioritizing pharmacotherapeutic guidance and monitoring to help improve patient quality of life. PC is still in its early stages in Brazil, having some factors that hinder its implementation, such as a lack of pharmacists in Healthcare Units.

By contrast, the use of plants for medicinal purposes in the treatment, cure and prevention of disease is one of the oldest forms of medicinal practice known to mankind, resulting from generations of accumulation of practical knowledge by various ethnic groups regarding the therapeutic action of these plants. Mistakenly, it is believed that herbal or medicinal plants are free from side effects, by virtue of their being natural. This causes the population to indiscriminately adopt their use, within a context of self-medication. When administered, however, these products can produce positive or negative reactions in the body. Given this scenario, and taking into account the continental size of Brazil, projects have been developed in order to provide pharmaceutical support to locations that lack the presence of a pharmacist, through the use of telepharmacy in the context of PC.

**Method 1**: Evaluation of medications and medicinal plants used by the population with regard to drug interactions and adverse reactions related to their use in remote regions lacking a pharmacist.

**Method 2**: Correct identification by a botanical taxonomist of the medicinal plants used by the Porto Alegre population, through the use of telecommunication tools following a specific protocol for capturing images of the plants grown in residences.

**Method 3**: Delivery of a training program for health professionals concerning the identification of medicinal plants used by the public and their interaction with medications made available free of charge to the population by the government.

**Results**: The study of interactions between medications and medicinal plants demonstrated that 21% of the Upper Xingu region population used medications or medicinal plants, and of these, 6% required some pharmaceutical intervention. In the city of Manaus, 59% of the population used medications or medicinal plants, and of these, 17% experienced some form of drug interaction and 51% required pharmaceutical intervention. In the city of Palmares do Sul, 61% of the population used medication, with 67% presented drug interactions and 39% requiring a pharmaceutical intervention.
The identification of plants using a telecommunication tool was found to be possible for 98% of the plants examined, with 2% of these not corresponding to the plant named. A 17% disagreement was shown between what the patient believed a plant to be and what the plant was confirmed as being by the botanical taxonomist. Different microclimates within Brazil, due to its continental size were observed, suggesting the need to link regionally specialist botanical taxonomists to a work such as this.

Conclusion: Telepharmacy applied to pharmaceutical care proved to be an important tool in improving patient quality of life, considering the number of interventions performed. The identification of medicinal plants by a botanical taxonomist through use of telecommunications tools was verified as being possible. Telepharmacy can be an important tool for ensuring the appropriate use of such plants by the patient.

Integrating Hospital Pharmacy and Community Pharmacy – Facing the Interoperability Challenge with IHE Profiles

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To efficiently operate the medication circuit, several information flows need to be integrated across the many actors: not only prescriptions between General Practitioners and Community Pharmacies, but also the complete medication information in the Hospital Pharmacies. For operational effectiveness, the workflows need to be managed and documented; for patient safety, also the information has to be available when needed.

IHE Pharmacy has produced profiles for Community and Hospital Pharmacy, which address the information exchange in a consistent manner, whether inside or outside the hospital. This presentation will explain how an eHealth project may more easily navigate this complex space by leveraging IHE Profiles. Each Profile is a building block of interoperability specification, which once mapped to the project requirements will be easy to specify and to combine with other widely used IHE profiles. A few examples such Hospital Pharmacy, epSOS cross-border prescription/dispensations and a couple national projects will be used as examples.
Establishing a Low-Cost Telecommunications Method for Tele ENT Consultations to Deployed Locations
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In many deployed locations, access to expert medical advice can be limited. The expansion of telemedicine has bridged this gap; however, the large and costly technology required to perform telemedical activities hinders its accessibility. This study aimed to develop a low-cost telemedicine method in order to perform tele ENT consultations for deployed military personnel. The results indicated an ability to transmit clear endoscopic images between deployed and garrison locations using low weight/cube/cost laptop based telemedicine technology.

Keywords: deployment medicine, telemedicine, military medicine

Electronic Personal Health Records in Canada: An Exploratory Review of the Literature
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Background: The electronic personal health record (ePHR) could facilitate information sharing, health professional-patient relationship as well as improving patient care. In Canada, stakeholders show interest in the implementation and use of ePHRs, but there is insufficient evidence about their benefits and potential effects on the healthcare system.

Objective: The aim of this review was to document the situation of ePHRs in Canada and to identify federal and provincial laws and policies influencing their implementation.

Methods: We conducted a review of the literature published between January 2003 and November 2013 in Google, Google Scholar and PubMed in order to find publications on ePHR systems available in Canada, the benefits and challenges related to their use, as well as proposed solutions to overcome these challenges. We also documented federal and provincial laws and policies related to ePHRs in Canada, as well as certification processes available for these systems.

Results: A total of 36 documents were identified. The benefits of ePHRs identified for patients were condition prevention, self-management and access to education and care. For the health system,
benefits were seen in the access to patient data, streamlining of administrative processes, research, public health, time gains, lower costs, and improvement in quality and efficacy of care. Challenges to the implementation of ePHRs in Canada mainly were related to user adoption as well as security, privacy and confidentiality concerns. Additionally, federal and provincial legislation and regulations identified pertain to electronic medical records and electronic health records. Because these norms are not designed for application to ePHRs, they rarely address appropriately challenges particular to ePHRs, notably on privacy and confidentiality, data usage, third parties and online communities. Finally, certifications available in Canada are still lacking for ePHR systems.

Conclusions: This review highlights the paucity of literature on the topic of ePHR and related policies in Canada. Most publications identify potential benefits for ePHR since there are few ePHR systems available in Canada.

**Keywords:** ePHR, implementation, legislation, Canada

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**Generic Evaluation Guidelines for Digital Technologies for People Living With Dementia**

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Burgeoning populations of people with dementia and the need to maintain independence and affordable care means it is inevitable that people living with dementia will be supported in part by digital health and social care technologies and services. Thus any such technologies where use by people with dementia is intended need to be designed for, or at least be configurable for, them. Previous work has shown there are shortcomings in the current state-of-the-art and argued that a special approach is required to innovating technology for use by people living with dementia (i.e. including their carers). This was presented in an innovation framework that while reflecting the paradigms of user centred design and iterative evolution of solutions was novel for explicit appropriate consideration of the dyad – the person with dementia and their carer – as users.

In the new work the step of evaluating any completed design in a rigorous way has been investigated through considering the content of the corresponding research protocol. This one step in the previous framework is complex to generate when multi-perspectives are considered for a generic context and where it is important to not get so specific to exclude a particular sub-population of people living with dementia nor digital technology. It is important that the project and the participant experience is as appropriate as possible through having people with dementia and their carers as advisors, while also employing methodologically and dementia appropriate data collection – e.g. observation, use of dementia-specific outcome measures, accounting for probable symptoms and therefore considering for example the evaluation duration and environment. In addition recruitment requires particular attention with a view to maximize participation of people with dementia and having appropriate ethics and consent procedures.

The authors propose that an evidenced based approach be evolved through international collaboration and be published as a guideline.

**Keywords:** dementia, digital technology, evaluation, methodology
Teilenursing among Patients Using Clean Intermittent Catheterisation
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Introduction: Telenursing refers to the use telecommunications and information technology to support the development of nursing. Various countries have used telenursing in the management of healthcare and have attained positive results while in Brazil, it is a field yet to be explored.

Objective: This study’s aim was to develop a telenursing strategy to assist patients with neurogenic bladder (NB) and users of clean intermittent Catheterisation (CIC) monitored by a rehabilitation center of a university hospital.

Method: A pilot study was conducted addressing the implementation of a telenursing intervention among 15 patients. Inclusion criteria were patients with NB or using CIC, older than 18 years old or younger than 18 years old accompanied by a legal guardian, enrolled and cared for by the aforementioned center, with access to a computer and internet service in their homes, and with health conditions to access these resources. The intervention was implemented by the primary researcher using telephone calls, chats, video calls, and emails. A free-toll hotline was available for patients 8 hours/day for 5 weeks. The actions implemented by a nurse included primary health care guidance, self-care encouragement, and clarification of doubts regarding the use of CIC and the rehabilitation process.

Results: A total of 21 telenursing consultations were provided: 13 (61.9%) were spontaneous calls while eight (38.1%) were actively (by nurse). The technological resources used included: 13 (61.9%) telephone calls and eight (30.1%) emails.

Conclusions: The intervention presented important results in the implementation of traditional healthcare treatment and also revealed barriers that need to be overcome so that this type of care is implemented in the healthcare service.

Keywords: telenursing, intermittent Catheterisation, bladder, neurogenic

The Feasibility Study for Clinical Application of Real Time Emergency Tele-ultrasonography using the LTE Smartphone
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Purpose: We aim to prove the feasibility of remote interpretation for ultrasound images using a smartphone-based real-time image transmission system.

Methods: Based on the consensus of the two blinded experts, 60 moving images of echocardiography examinations; 30 showing the ejection fraction above 50% and the remaining 30 showing the ejection fraction under 50%, were consecutively selected. In the case of abdominal ultrasound examinations, 60 cases with suspected appendicitis were selected. 30 had signs of acute appendicitis and the other 30 had no findings of appendicitis. The image transmission system was installed on our ultrasound machine (E-Cube 15, Alpinion medical system, Seoul, Korea) and the smartphone application, CubeView, was downloaded onto the smartphone. Using this system, the diagnostic performance of
evaluating left ventricular (LV) systolic function by measuring the ejection fraction (EF) and evaluating the presence of acute appendicitis was investigated by four reviewers. They reviewed the original images using the LCD monitor of an ultrasound machine and also reviewed the same images using a smartphone, which was transmitted from the ultrasound machine by the above system. They graded whether the LVEF was normal (EF>50%) or not, and probability of acute appendicitis for each examination using a five-point Likert scale. The image quality was also measured using the double stimulation impairment scale (DSIS).

Results: The average area under the receiver operating characteristic curve for each reviewer’s interpretation between the LCD monitor and the smartphone for both moving and static ultrasound images were not significantly different (P=0.35, P=0.12). The mean score of DSIS was 4.2 (SD: 0.6), which means that the image quality of the video between the two displays was not significantly different.

Conclusions: We verify the feasibility of remote interpretation for ultrasound images on a smartphone which are transferred from an ultrasound machine by a real-time image transmission system

Keywords: telesonography, clinical imaging viewing, smartphone

Development & Clinical Application of Teleultrasonography Using a Smartphone based Real-time Image Transmission

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Purpose: We aim to introduce our findings of tele-ultrasonography using a smartphone-based real-time ultrasound image transmission system.

Methods: The ultrasonography machine in our emergency department (ED) was equipped with the real-time image transmission system (E-Cube 15, Alpinion medical system, Seoul, Korea). From June 2014, using this system, on-site ultrasound performer could seek a remote experts’ mentoring and these practices were recorded in predesigned registry, which included patients’ information, type and speed of mobile network, type of diseases, initial diagnosis of on-site performer, the diagnosis after tele-mentoring, the problems encountered during the practice and etc. The subjective quality assessment for the images on the smartphone was graded by tele-mentoring experts using the five-Likert scale.

Results: There were 21 cases which were tele-consulted using this system between June and July 2014; Of these, ten cases (47.6%) were suspected acute appendicitis and four (19%) were suspected acute coronary syndrome. The LTE network was used in 14 connections and the remaining seven were connected via WiFi. The average connection speed was 67.6 (SD: 25.8) Mbps. Users complained of a little delay time, but they stated it did not significantly affect the tele-mentoring. All of the subjective image quality assessments were moderate to very good (mean: 4.2, SD: 0.6). Most initial diagnoses of on-site performers (19 cases) were not changed after tele-mentoring, but the on-site performer stated that they could have increased confidence in their diagnosis after tele-mentoring. The diagnoses after tele-mentoring compared to the final diagnoses of each case which were
confirmed by pathology, clinical follow up and the results of other experts-performed ultrasonography were identical.

Conclusion: Although the number of cases enrolled was quite small, there were no significant problems during the tele-mentoring using the smartphone-based tele-ultrasonography system, and this system was usually used as the assistant device for obtaining experts’ help in diagnosing equivocal cases.

**Keywords:** telesonography, clinical imaging viewing, smartphone

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**The PROMIS® Translated Short Forms as the Optimal Research Tool for Studies in Polish Telemedicine**

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Introduction: Patient-reported outcomes are an established in clinical studies in various medical specialties. Telemedicine frequently uses questionnaires as the Patient-Reported Outcomes Measurements. Polish Telemedicine Society has undertaken efforts to use Patient-Reported Outcomes Measurement Information System (PROMIS®) as the main outcomes research methodology. It consists of calibrated item banks for measuring several domains of health status for evaluation people with a wide range of chronic diseases.

The aim of this study was to show current implementation of already available, translated short forms and translates and cross-culturally adapt the PROMIS physical function item bank to the Polish language and use it in a sample of patients with arthritis.

Methods: Patients suffering osteoarthritis were subjected to questioning for translated short forms validation. Selected items of the PROMIS® item bank were translated using rigorous forward-backward protocols, and the translated version was subsequently cognitively pretested in a sample of Polish patients with osteoarthritis.

Results: Telemedicine oriented Internet-based surveying system worked well. Only a few issues had to be rewritten because of culturally inappropriate content in the forward-backward translation. Questions of the Polish version were understood as they were intended while only a few items of them required rewriting.

Conclusions: Authors assume that the translated version of the PROMIS short forms of pain intensity, Pain interference and physical function are optimal options for telemedicine and telerehabilitation studies. Future work will be directed at creating a Polish final version of the item bank to be used in telemedicine research with Polish speaking population.

**Keywords:** telemedicine, patient-reported outcomes, PROMIS®
Building a Dataset of Smartphone Inertial Sensors Measurements to Study Falls and Mobility in Older People
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The mobility of people declines with increasing age, giving rise to problems such as gait disturbances or fall risk. Wearable inertial sensors are capable of measuring the activities performed by the person carrying them. Smartphones are popular devices including such kind of sensors, and they are thus good candidates for using in everyday life, although they cannot reach the information level of a full set of sensors attached to fixed positions of the human body. Many studies have been recently published using smartphones for fall detection, fall risk assessment or physical activity monitoring. However, it is difficult to compare them, since each one uses their own measurements.

In this regard, the present work explains the ongoing work to build a dataset of smartphone accelerometer measurements. Our team is composed of engineers, doctors and psychologists. After reviewing several papers, we have come to a first agreement in the set of measurements to be performed. Our expected result is a set of accelerometer patterns of older people tagged with geolocation and recorded in real-life. In addition, each person will be characterized by several items using questionnaires and clinical tests. Among the first group, we will include questionnaires to collect general information, socio demographic information, morbidity, fall incidence, social interactions, independent living capability and fear of falling. Among the second group, each volunteer will perform the Timed Up and Go Test, the Performance Oriented Mobility Assessment and the Romberg’s Test. The dataset will be made public and it will be used to study the relationship between physical activities and health status, predict fall risk or assess fall detection algorithms (at least to evaluate false detection rates if no real-falls are registered).

Keywords: inertial sensors, smartphone, fall risk

Impact of Child Count+ Mobile Health Technology on Malnutrition Screening in Children Under Five Years in the Millennium Villages Project in Ruhiira, Uganda
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Objective: The Millennium Village Projects (MVP) address inequalities in healthcare across sub-Saharan Africa. We studied the impact of mobile health technology (ChildCount+) on consistent childhood malnutrition screening in Ruhiira, Uganda.

Methods: A prospective cohort of 10, 242 children was screened for poor nutrition by community health workers (CHWs) using mid-upper arm circumferences (MUAC) between February 1, 2010 and July 31, 2012. CHWs collected data using a mHealth SMS platform called Child Count+, paper forms,
or a combination of both. All data was stored in OpenMRS, an open-source electronic medical records system for under-resourced countries. We analyzed the data for associations between SMS use and odds of consistent follow-up visits (within 90 days of previous visit). We determined whether SMS use for only the first visit, only the second visit, either visit, or over both consecutive visits influenced follow-ups. Confounding variables included age of child, gender of child, number of children per household, age of household head, gender of household head, and the number of children per CHW.

Results: A stepwise multivariable regression showed a strong association between SMS use and consistent malnutrition follow-up visits in crude and adjusted models (Crude OR: 3.02 [95% CI: 2.82-3.24]; Adjusted OR= 3.23 [95% CI: 2.91-3.60]). The association was stronger if SMS was used at only the first visit than at only the second visit, although any SMS use was better than no SMS use (Adjusted OR: 2.47 [95% CI: 2.30-2.64]. The association was strongest with exclusive SMS use over consecutive visits (Adjusted OR: 18.14 [95% CI: 12.99-25.32]).

Conclusion: Consistent follow-up reminders through SMS positively impacted screening for a vulnerable pediatric population. These results have profound implications on effective rural health policy for remote under-resourced populations.

**Keywords**: mHealth, childhood malnutrition, pediatrics, rural healthcare delivery, mobile health

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**eHealth Application: Home Monitoring System**

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Home Monitoring is a new trend in the health sector that is based on patient monitoring in out-of-hospital conditions. It has been attracting a plethora of attention from researchers and healthcare practitioners in hopes of reducing the medical costs. Many surveillance systems have been developed so far, and the market trend lies mostly on video-based surveillance systems nowadays.

This paper proposes a Home Monitoring System that performs a surveillance on especially old and walking-impaired patients by benefiting from a specific acceleration-based fall detection algorithm that detects a fall of a patient by measuring a patient’s acceleration level. With knowledge of the acceleration level of the patient, a medical practitioner is more likely to be notified once the target patient is fallen on the ground. The patient can be monitored by either a PC or Smartphone, which are two of the most-commonly used devices to perform the monitoring. Both devices communicate with an external accelerometer-included kit over Bluetooth Low Energy interface and thereby obtain the monitoring by receiving acceleration values from the kit. The monitoring device will get alerted during a fall detection, and then immediately parse the fall-detection to a public-accessed Web Service, which a local hospital can gain access to in order to obtain statistical fall detection information about the targeted patient. The paper presents further with a comparative analysis of both devices, and evaluates them based on results, benefits and drawbacks. By following the instructions and test, this paper offers guidance to the health sector for implementing an efficient Home Monitoring Service. The testing of both functional- and non-functional requirements specification has been performed successfully and is approved for both the Smartphone and PC.

**Keywords**: eHealth, home monitoring, fall detection
Using Transcontinental Telementoring to Train Laryngoscopy to Medical Students in Hanoi, Vietnam from Omaha, Nebraska
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The use of a direct laryngoscope can lead to obstructed views of the airway, resulting in misplacement of the endotracheal tube. Advancements in telemedicine have resulted in the development of the video laryngoscope, an instrument, which utilises video technology in order to obtain a clearer view of the glottic opening.

Researchers compared these two intubation techniques by training students to use the instruments via distance communication. After training, 100% of the students successfully intubated a mannequin using the video laryngoscope and 75% of the students successfully intubated a mannequin using the direct laryngoscope. It is believed that these results indicate that distance communication can be used to train and mentor students during medical procedures.

Teleconsultation in Veterinary Care: Maintaining Public Health by Deworming and Treating Neutered/Spayed Cats and Dogs on Sao Vicente, Cape Verde
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Introduction: The lack of local veterinarians to help with the treatment and the assistance of spayed/neutered dogs and cats under the project “Fighting stray dogs on Sao Vicente – A pilot project for the Cape Verdean Islands” has made necessary to employ lay staff for the management of these patients. A vet nurse with no specific education takes care of the spayed/neutered animals with the support of protocols prepared by the staff of the chief veterinary surgeon in Italy and the staff themselves, when needed for difficult cases.

Objective: To enable lay staff to take care of spayed/neutered and microchipped dogs with remote support in three main areas: post-operative care, deworming, emergency care. This activity is part of the project "Fighting stray dogs on Sao Vicente – A pilot project for the Cape Verdean Islands" co-financed by the European Union as a way to contribute to public health. The project provides for the castration, microchipping, deworming and aftercare of 10.000 dogs with the aim to control the canine population of the island, to make them more adoptable by the local families, and to make them safer as playing companions for the children living on the street, for whom puppies are often the only toy available.

Materials and Methods: The lay staff rely on: 1) a very limited list of drugs that allow to treat the most common conditions, such as internal/external parasite infestations (mainly round worms, tapeworms, fleas and ticks), erlichiosis, piodermitis, mycosis, mange, infections, traumas and tumors, especially Sticker’s tumor; 2) a protocol for the treatment of each condition based on the principle
“primum non nocere” (first, do not harm), that excludes for instance the use of steroids, cardio drugs, diuretics, antipyretics, if not explicitly recommended for the treatment of very specific conditions or after the tele-consultation; 3) teleconsultations with the chief surgeon or her staff for difficult cases. A standard form containing all the animal data and vital parameters is filled up by the lay staff and sent per email to the central clinic in Italy together with pictures if required. Two cases per week are handled in average, including eye conditions, skin problems, systemic diseases and lesions caused by traumas.

Results: Since the beginning of the project, there has been a remarkable improvement in the health condition of the canine population of the island, together with an increase in the awareness about the importance of animal health. Due to the very low mortality rate of the operated animals and the very high recovery rate of the patients treated, most of whom arriving to the clinic in very bad conditions, the free treatment offered by the project in conjunction with the neutering/spaying is high in demand. This allows keeping alive and in good health the spayed/neutered animals as a way to control canine population of the island and to ensure a higher level of public health.

Keywords: tele-consultation, veterinarian medicine, lay staff, public health
Discussion: The presented concept is rigorously designed. Yet, a test has to be conducted to show whether the used triggers are suitable for this concept. A proper format which is necessary for the pseudonymization process still has to be evaluated. The utilised Open Source framework proved itself to be suitable to facilitate the data integration into the RRP.

**Keywords:** Research platform, architecture, PEHR, secondary use

**Country-Specific and Non Specific Solutions Used in Telemedicine and eHealth in Poland during ISfTeH Decade**

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Introduction: Several factors may influence on the development of telemedicine and eHealth in different countries namely: needs, geography, epidemiology of certain disease, personal interests, etc. The aims of the study was to identify country-specific telemedicine and eHealth implementations, originally develops in Poland and differentiate from the group of non-specific implementations that are commonly used.

Material and methods: The search of telemedicine and eHealth implementations was performed based on PubMed Medline database and Med-e-Tel presentations database. The period of the study covered a decade of ISfTeH.

Results: Hearing and speech screening, Remote hearing devices fitting, Web-based fracture healing monitoring, Posture telescreening (detection of scoliosis and kyphosis), Telepulsoxymetry and cardiac or musculoskeletal telerehabilitation were identified as more Country-specific telemedicine and eHealth implementations. Teleradiology, TeleECG, Remote monitoring of implanted cardiac devices, Telecare, Telewound care (diabetic foot, and chronic wounds) were considered country-non-specific services.

Conclusions: Various conditions influence on telemedicine and eHealth development in different countries. Some factors seem to have higher impact for the development of particular implementations.

**Keywords:** country-specific implementations, telemedicine, eHealth

**A New Generation Perspective on Distance Treatment in Social Media Age**

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With the rise of internet-capable devices, and internet usage it becoming more of a frequent resource to seek for information online. Medical information on symptoms, diseases and treatments are not excluded from digitalization. Doctors now face more and more patients that have ‘googled’ before visiting them.
We are convinced that this shows that there is a huge need for a) sufficient, reliable and understandable medical information online and b) an online dialogue between doctors and patients. Doctors and patients are not two isolated groups on the internet, they are both users and they share the same platforms. As part of a generation which is familiar with online-conversation, e.g. instant messaging and video-conferencing, this technology is no longer an extraordinary form of communication. To the new generation of patients, doctors and medical staff communication via the internet becomes part of the everyday life and simplifies interpersonal communication including the communication in healthcare especially in terms of the physician-patient consultation.

In some countries, such as Germany, remote diagnosis and consultation from doctors is forbidden by law. In our eyes this regulatory framework opposes innovation in healthcare and does not meet the needs of young doctors and patients for e-health solutions and social-media-communication as one of the future pathways in doc-to-patient-interaction.

We advocate for changing existing rules that may hinder the development of new forms of doc-to-Patient-communication and to allow remote diagnosis and remote consultation under certain circumstances. Social media will change the channels of communication between doctors and patients anyways. It is therefore our duty as (future) doctors to supervise these changes with a productive and not a preventive attitude while keeping an eye on patient safety and needs.

**Keywords**: new generation, social-media, distance treatment
The Experience of the Telehealth Network of Minas Gerais, Brazil
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Brazil has continental dimensions and large number of cities. Specialized healthcare is concentrated in the bigger cities, therefore the referral of patients from primary to specialized care may be difficult and costly. Telehealth can be an effective tool to increase the access to specialized healthcare, especially for remote areas.

Our aim is to report a successful and sustainable experience of a large scale telehealth service in support of primary care practitioners, the Telehealth Network of Minas Gerais (TNMG). The network was implemented by public funds, mainly from the state government and research development agencies, to connect specialists from 6 public universities to primary health caregivers in remote cities.

The project begun in 2006 with 82 cities and was expanded several times, reaching 722 cities in Minas Gerais state, Brazil, in 2014. The main activities developed by the service were tele-electrocardiography (EKG) and teleconsultations.

Satisfaction of healthcare practitioners was systematically evaluated. A detailed cost evaluation was performed. Since 2006, the TNMG performed more than 2 million EKGs and 65,000 teleconsultations. In 2014, an average of 2,200 EKGs and 40 teleconsultations were performed per day, and the average ratio of users’ satisfaction was 96%. In relation to EKGs, 55% had no abnormality. The teleconsultations questions were associated with a clinic case in 82%, and 18% were theoretical questions. The activities averted potential referrals for specialized health care services by 80%. The return on investment was 4:1. Some factors support the sustainable and continuity of the TNMG: government-academia partnership, support of public managers, services provided by a collaborative network, systematic monitoring of the services, audit system for EKG and teleconsultations, response time, ease of use of the system, growth and diversification of telehealth activities, research development and economic viability monitoring.

In conclusion, the large number of activities performed by TNMG shows its important role in improving the access to specialized care, facilitating universality, equality and integrality of healthcare.

**Keywords**: teleconsultations, electrocardiography, primary healthcare
MediCloud is a robust, web-based (cloud system) platform for supporting medical interactions including rounds. In many situations the discussion of a case among MDs from different profiles and locations is crucial for patient outcome. Studies show that the concentration of specialists in big cities in Brazil is one of the causes of the lack of adequate medical diagnosis and treatment in underserved areas. MediCloud will allow general practitioners at remote or rural areas to discuss cases (rounds) and request second opinions to their expert colleagues located in reference hospitals. For validation purposes, it will focus on dermatology and level 1 radiology medical specialties. A software framework was developed to support the telemedicine application, providing the basis for security communication and user's hierarchy. The software implements a hierarchical discussion forum to practitioners and specialists exchange information. The software algorithms enhance the medical discussion providing useful information to users such as photos, symptoms, treatments and applied drugs of previously discussed cases. The software implements technics like Natural language processing (NLP), more specifically a named-entity recognition (NER) algorithm. NER is a subtask of information extraction that seeks to locate and classify elements in a text (user's post) into predefined categories. The created NER algorithms use linguistic grammar-based techniques as well as statistical models (machine learning). The information exchanged on the forum is processed by the software that creates a knowledge database to provide value-added information to medical discussions. The software analyses uploaded text and photos, identifies Keywords and crops photo’s areas to compose the knowledge database. For each user's post, the software seeks the knowledge database for similar cases. The business model will be developed during the pilot phase of the project, when ISCMPA – Santa Casa de Porto Alegre hospital will be leading medical discussions as a reference center. ISCMPA will exchange medical information with three health care centers in the rural area of the Rio Grande do Sul State.

**Keywords:** telehealth, second opinion, web semantics, NLP
Method: We used the National Ambulatory Medical Care survey (NAMCS) and National Hospital Ambulatory Medical Care survey (NHAMCS) data bases from the United States Centers for Disease Control (CDC) to determine the reason patient were seen for office or outpatient visits from 2006 to 2010. Diagnostic tests, hospital admissions, and admissions for observation related to the visit were captured from this data set. We ranked symptoms by risk of admission (hospitalization and observation) and by counts of diagnostic testing.

Results: From the combined 2006 to 2010 national data set sample there were 127,807 office visits, 134,653 emergency visits and 132,410 outpatient visits for those age 18 and over. Of these 22,479 had outcomes of hospitalization and 284,375 needed 792,422 additional diagnostic testing. There were 696 emergency department, 747 outpatient department and 744 office visit presenting symptoms for visits in this sample data set.

Conclusions: National datasets may be used to provide some indication for appropriateness of an E visit for evaluation of different symptoms. This could help institutions prioritize symptoms that could be included in a menu of possible e-visits. Future studies are needed to evaluate this from the perspective of quality, safety, cost and patient and provider satisfaction.

Keywords: evisit, e-visit, symptoms

Teledentistry: An Alternative Model of Oral Health Care
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The outcomes of three teledentistry projects in the areas of teleconsultation and telediagnosis will be presented: a proof-of-concept study, a study targeting older adults living in residential care, and a study targeting children and adolescents living in regional and remote areas of the Australian state of Victoria. The main aim of the studies was to address priorities established by Australia's National Oral Health Plan. The studies aimed to test an oral health model using teledentistry as an additional step in closing the gap in the provision of sustainable oral health care services to high-risk populations living in underserved areas. Building on these experiences, the next step will be the testing of alternative oral health care models that can combine health promotion, local capacity building, remote oral examination and treatment plan development with triage systems. These can trigger different levels of clinical and preventive intervention by different oral health professionals (dental therapists/hygienists/technicians, dentists, dental specialists, etc.). As this will increase demand for local oral health care services, the proposed model will need to incorporate treatment opportunities to address the additional demand. For example, the remote consultant might provide advice to local health staff (or carers) on how to maintain the oral health of the participant, or provide advice to local private dentists with respect to the need for, and timing of, specialist care. Where these are not possible or available, and to avoid increased demand for local oral health care services, the proposed models would need to incorporate alternative service delivery systems to address the identified demand for dental care for underserved populations groups in non-traditional settings. From a public health perspective, the evaluation of the success of these models and their sustainability will be
dependent on the ability to clearly demonstrate service and economic benefits from the service provider’s perspective. Supportive business cases, to a large extent, have not been captured by earlier telehealth projects.

**Keywords**: oral health, intraoral camera, nursing-homes

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**Teleconsultations on the Assistance of Primary Care Nurses of a Developing Country: The Experience of the Telehealth Network of Minas Gerais, Brazil**

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In Brazil, the majority of healthcare resources and healthcare professionals are concentrated in the largest cities. Nurses, then, take up an important role on the assistance of patients in primary care in remote cities. Our aim is to assess the teleconsultations requested by nurses sent to the Telehealth Network of Minas Gerais, a public telehealth service which attends 722 cities in Brazil, in order to demonstrate the importance of the telehealth to support these professionals.

This retrospective and observational study analyzed all consecutive teleconsultations requested by nurses from the beginning of the service on April 2007 to February 2014. The teleconsultations were classified according to the professional who requested and the specialist who answered them. Through the study, 30,258 teleconsultations requested by nurses were performed. The majority was directed to medical subspecialties (76.5%), mostly dermatology (20.2%), gynecology/obstetrics (12.9%), internal medicine (5.2%) and pediatrics (4.9%); and 20.7% were directed to nurses. Of all teleconsultations, 66.5% were requested during the primary care units working hours (8am to 5pm).

Regarding the cities from where the teleconsultations were originated, 69.0% of them had less than 10,000 inhabitants, 33.3% had less than 5,000 inhabitants, and only 7.2% had more than 20,000 inhabitants. Out of a total of 632 municipalities that ever requested a teleconsultation, 10 (1.6%) were responsible for 11.9% of all teleconsultations. On average, these 10 municipalities had a population of 8,802 inhabitants, a distance from the state capital of 368.8 km, an HDI of 0.641 and a per capita income of 175.76 USD per month.

In conclusion, this analysis suggests that nurses perform teleconsultations directed mainly to medical subspecialties, especially dermatology. A significant amount of teleconsultations were sent outside working hours, which suggests a commitment from the nurses to the service. The social data of the 10 most requesting municipalities complies with the thesis that they are mainly small cities, far from the capital and with a limited resourced population.

**Keywords**: telehealth, teleconsultations, nursing, primary healthcare

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**WITELM: The Case for a Socio-professional Network of Teleconsultants**

J. Cinqualbre

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As stated by Jeff Bauer “telemedicine is practicing medicine at a distance ... at any distance”. Teleconsultation is the core procedure in telemedicine. To achieve this goal, the first stage was technical in nature; the second is powered by human resources. A network of physicians, worldwide, has to be established in order to meet the demand in overcoming, languages, ethical and cultural barriers, as well as legal and compensation issues. This is a mission devoted to WITELM. WITELM is an acronym for “World Institute for TeLeMedicine”. As a French initiative, with headquarters in Strasbourg, this Academic Institute is open to founding members from each country which is willing to participate. Join us on the WITELM booth at Med-e-Tel 2015 in Luxembourg or/and apply at: www.witelm.org.

Telecare and Telehealth Services Using INSPECTLIFE Platform
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Telecare and telehealth complex information platform InspectLife includes several telemonitoring services (Telemonitoring of glycaemia, Telemonitoring of blood pressure, Telemonitoring of ECG, Telemonitoring of body weight, Teleconsultation) which could provide better and accessible care for chronic patients and also better communication possibilities for care providers and care consumers. Telemonitoring measurement devices with wireless Bluetooth data transfer and mobile application are utilised.

One of the goals was to validate and certificate InspectLife platform as medical device. Therefore pilot projects with real patients were organized for telemonitoring of glycaemia, hypertension and ECG to validate data integrity in transmission, system usability and doctors evaluation. Also pilot project for assessing the images on distance was conducted and simulated assistance scenarios for bathroom emergency and house appliances were also tested. Moreover, telepharmacology module for optimal dosage regimen is presented (based on MWPharm system).

Keywords: telecare, telehealth, telemonitoring, telepharmacology
Systematic Literature Review on Telemedicine Solutions Implemented for Management of Patients with Heart Failure
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Background: Telemedicine had been applied for management of various chronic diseases. Heart failure is a chronic condition that causes a burden for patients and healthcare resources.

Method: A systematic literature search was conducted through PubMed, Elsevier, and the Journal of telemedicine & telecare. Through the primary search 70 articles were collected from the MeSh terms; telemedicine, telecare, and telemonitoring in conjunction with heart failure. Through primary and secondary exclusion criteria 11 randomized controlled trials (RCTs) were obtained for further analysis. The selected RCTs were assessed based on the Cochrane Collaboration's tool for assessing risk of bias. A total of 9 articles met the inclusion criteria and obtained satisfactory scores from the assessment of risk of bias.

Results: The results from the selected studies showed that mobile phones and telephones with internet access were the most applied telemedicine solutions (N= 6/9). Monitoring of health indexes was mentioned as the most required intervention for patients with HF (N=8/9) and weight, blood pressure, heart rate, oxygen saturation, and ECG were the most often variables that have been measured in these studies. In terms of clinical outcomes, the rate of hospital admission and readmission (N= 6/9) and patients' self-care and adherence (N= 5/9) were investigated mostly in selected studies. There were contradictions among the studies in terms of finding the significant results. These differences in the results could be drawn from variations in defining the telemedicine solutions, interventions, data collection methods and the focus of the studies. Finally, the most pronounced limitations and challenges in telemedicine related researches were; low sample size, short duration for the interventions and lost to follow-up (N= 6/9).

Conclusion: Evidence on the usability and effectiveness of telemedicine solutions for patients with HF is still limited. Increasing interaction and offering frequent monitoring of health indexes will reduce the rate of hospitalization, mortality and increase the quality of life, knowledge, and self-care of the HF patients

Keywords: telemedicine, telecare, telemonitoring, heart failure

Patient Portal Drug Interactions Search Engine “MedCheck”
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“MedCheck” is a search engine that can be implemented in the online patient portal and health care provider systems as an icon to click and use it easily. Additionally, MedCheck is provided with voice-aided search function to be used by persons with special needs or who can’t use typical keyboards. MedCheck enables users to check different kind of interactions: 1-Drug-Drug interaction; 2-Drug-Food; 3-Drug-Condition. MedCheck runs when user inputs manually the scientific name of the medicine (drugs and supplements) to search for all types of the drug interactions including “Drug-Drug, -Food, -Condition” interaction to minimise the risk of any further interaction might not be expected. MedCheck works in a synchronized interoperable data exchange framework with Interaction database, ePrescription system, Electronic Medical Record (EMR), National/FDA medicinal database and ICD-10 database. Meaning that MedCheck will initially retrieve the user’s information to check automatically their health condition (e.g. pregnancy, chronic diseases), basic data (e.g. age, gender) ePrescriptions, and “Critical time data” if present (e.g. Allergy, chronic diseases) then customize and integrate that date with others retrieved from different information systems in the digital online framework to consider it in the search results. MedCheck can work with other electronic support function “Pill Identifier” that enables users getting informed about what medicine they use/have in case of lost packs to input the scientific name correctly in the MedCheck. MedCheck offers two types of interfaces to serve medical and non-medical users. For non-medical users (patients or relatives); the search engine results are easily understandable in non-medical terminologies and multi-tiers threatening colors stand for this order (safe, significant, serious, contradicted) including recommendations and actions to take. For health care professionals, MedCheck interface runs in sequential steps.

Keywords: eHealth, decision support, drug interactions

Evaluation of eHealth Systems in Rural Areas of Rwanda (A Case Study Done in Kayonza and Kirehe Districts)
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Introduction: eHealth systems were deployed as a technology solution in Rwanda to improve the health care service delivery in rural areas. Ministry of Health with e-health strategic plan (2009-2013) as the roadmap implements eHealth systems, catalyzed by funding from developed countries and nongovernmental organizations. TRACnet adopted as a solution for the health challenge of HIV/AIDS is the stepping stone that motivated the government to deploy other eHealth systems. Noticing the paucity of documented evidence of success of eHealth systems, the researcher took an interest to understand in detail the sustenance of the eHealth system in rural areas of Rwanda. Evaluating the availability of e-health systems in rural areas, process of implementation, benefits and challenges was the chosen scientific approach to bring out a clear picture.

Objectives & Methodology: A qualitative cross sectional case study was done using retrospective information. Purposive sampling was done to select district hospitals and health centers in Kayonza and Kirehe Districts that were documented to be the pioneer areas of eHealth implementation. Data collected using in-depth interviews, questionnaires and observation was analyzed using systematic grounded theory approach.
Results: Results revealed that Rwanda has effectively utilised ICT infrastructure to meet health needs of the rural population. Health centres of Kayonza and Kirehe district rollout on Community based information systems, EHR, public health information systems and e-LMIS. Systems for human resource and medical equipment reporting were found in district hospitals of Kayonza and Kirehe. Despite challenges, the benefits motivated successful implementation of these systems.

Conclusions: Six eHealth systems were identified operating in health centres and other three in district hospitals of Kayonza and Kirehe districts of Rwanda. E-health system implementation in Kayonza and Kirehe was found to have remarkable strides towards the transition for equal access, community development and better health care.

Keywords: eHealth system, rural areas, baseline

m-Health for Home Care Services for Diabetic Type 1 Clients in Rwanda Diabetic Association: Case of Kigali City
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Background: Type 1 diabetes management require more than diet or drug management by clinical team. Since type 1 diabetes is chronic condition effective patient engagement through home-patient centered care including the use of mobile devices promote multiple benefits such as reduction of the delays for treatment, medical complication, medical expenses and health workers workload. Diabetes account 1.3 % of death rate in Rwanda and it is classified among top 5 causes of mortality at University Teaching Hospital of Kigali between 2012 and 2013. Existing evidence shows the importance of mobile devises for patients monitoring and communication in management of Type 1 diabetes. There is therefore no information related to what extent type 1 diabetic patients use mobile devices in self-management.

Objective: This study assessed which mobile devises are in use for home-patient centered care establishment for type 1 diabetes management in Rwanda.

Methodology: A quantitative cross-sectional design was used. Sample sampling method was used to select 122 participants at Rwanda Diabetes Association. Student’s chi-square was performed to determine the association between variables.

Results: The results indicated that 50% of participants are students with mean age of 20 years. 99% of participants have Glucometer, 13% have Blood Pressure device and 33% have thermometer. 93 % of participants report their home measurement in the logbook. 97 % do have mobile phone in their home. 69.4% use mobile phone to call health personnel, 22% use SMS to send information to health personnel. There was no significant association between education level and reporting home measurement (P=0.58).

Conclusion: Telehome care services are being practiced in type 1 diabetic patients in Kigali. The patients report home measurements through logbook. Since patients and their family members do have mobile phone and measures devises there is a possibility to automatic patient monitoring system using mobile phone.

Keywords: m-health, telehome care service, diabetes
Assessment of Health Informatics Competencies in Training of Undergraduate Healthcare Professionals in Rwanda
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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.

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. Data collection was carried out using a standardized questionnaire.

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%).

Conclusion: There is a low presence of health informatics competencies in the studied curricula.

Keywords: health informatics, competences, undergraduate programs

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Smart Insole for Measuring Actimetry of Frail People
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Prevention of dependence represents a major healthcare issue. Frailty is a syndrome determining a higher vulnerability to stressors. It is responsible for an increased risk of major negative health-related events, including disability. Fried et al. from 2001 criteria are the most commonly used by the medical community to identify frail subjects. The main criteria are: gait speed, less muscle strength, exhaustion, sedentariness, and involuntary weight loss.

In order to encourage sedentary people to practice walking, we propose to develop an economically viable technical device facilitating the follow-up of frail elderly people. In a previous paper (Charlon Y, Bettahar F, Campo E, "Design of a smart shoe insole to monitor frail older people", International Conference on Modern Well-being for Societies and Territories (LivInWell), Sainte-Feyre (France), Mars 2013, 6p.) we have presented the electronic design of a smart shoe insole to quantify the human movement without constraint of positioning. This device embeds some sensors and a wireless communication. The smart insole allows measuring the gait speed and its variability and daily activity with minimum invasiveness. It performs measurements continuously and automatically during the walking periods, both indoor and outdoor. This wireless insole transmits information to a local database which can be consulted from a secure Internet connection in real time.

This paper focuses on the algorithms that evaluate the stride length. It presents several methods for measuring the gait dynamic parameters and gives preliminary results.

**Keywords**: frailty, gait, elderly, autonomy, activity
to establish the Auton'Hom-e master program, a unique degree in Europe dealing with the expectations of the Silver economy.

The initiative was born out of a partnership with the Limousin territories who wished to promote economic development through new jobs linked to the aging of the population. The Urban Community of Grand Guéret (UCGG) initiated the idea of university degrees which objective would be to train "architects" of socio-economic solutions for home support; a largely transverse theme since it encompasses technological skills, sociological, medical, socio-economic and medico-social. To complete the project, the University has jointly worked with many local, national and international partners, including the Legrand company based in Limousin, now a key player in electrical equipment solutions of modern habitat. In 2009, Legrand joined the consortium of regional actors to work on securing access in institutions for persons with Alzheimer's disease. The implemented solution allows these patients to move freely and safely. In addition to its active participation in the academic process especially through its "Innovation team” that pushes the project initiatives and ideas, Legrand organizes each year in partnership with the University and also at the national level a "Campus Legrand" Challenge which objective is to stimulate innovative initiatives in the use of equipment of modern living for people with loss of autonomy. The company is now like UCGG, a member of the Master Development Board; a partnership that can scale the academic content and methodologies related to professional issues. Both partners are actively involved with a dozen others to logistical and financial operations of the master and both are natural and indispensable allies for the University. With the support of its partners, the Auton'Hom-e master provides a double master's degree with the University of Sherbrooke in Quebec within a consortium of 14 universities in 12 countries

**Keywords:** transversality, codesign, university, industry, territories

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**Definition, Implementation, Coordination and Evaluation of ICT Tools on Maintaining Independence at Home**

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Almost every study concerning patients with loss of autonomy at home is in the medical field. Those persons are perceived as ill subjects called patients; the research areas are based on the hospital model. Health professionals have little information concerning habits and lifestyles of the patients at home, but also about cultural and emotional experience of migrant populations or social data. The adaptation of the housing and the implementation of solutions are mostly made after an incident or an accident at home. The people concerned are rarely involved in decision-making on technology.

How does the daily professional approach include the information, the advice on public health or home prevention? How is the information transmitted between the main actors? Publications related to the use of new technologies in areas such as telecommunication, telemedicine or tele vigilance show that the technologies are rarely efficiently used and often ignored or rejected. The reasons are seldom described and there are few research laboratories that include the weakened person in the research of new technologies solutions. Given the large number of organizations and professionals in this field, this research focuses on the overall description of a framework available in several modules:

- The health course perceived by the patient,
- The relations between the citizens/relatives and the health professionals,
• The place of the coordination,
• The description of the various sources of information and their inter-relations.

When recognized as main actors, weakened persons can express their opinions and suggest solutions and innovations throughout their health course. In this way, the solutions can be customized and relevantly optimized. How would these solutions be perceived? What would be the impact on the acceptance and the appropriation? What would be the most relevant models? This study aims to focus on the status of the concerned people: recognizing them as full citizens, acting in the society, in the cultural and health domains; as well as changing perspective on their path between the intra and extra hospital.

**Keywords:** acceptance, technology, health course, models

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**Home Automation and Self-Sufficiency**

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Recently the research and development of home automation and ambient assisted living systems have offered many technological solutions. At the same time there are running discussions about ethical and legal issues connected with application of these technologies. However, the question of self-sufficiency and the right moment of introduction of the technology in home environment has not yet been satisfactorily investigated.

There can be two extreme views. The first one is too technocratic: make the house/flat as smart as possible, introduce automation everywhere. The second one we can call minimalistic: introduce technology only in cases when the human function or ability needs obvious support or replacement. Recently several applications have been developed that help to access self-sufficiency of a person and recommend type of aid that can support the person’s activities. However the reality is usually more complex and the application of various tools and devices should be at least to a certain degree Personalised. Most of us welcome automatic control of the heating system. On the other hand many people prefer opening windows to air condition. Sometimes the need to open window is subjective – strange smell after cooking, from candles, etc. The automatic detectors (till now) can evaluate temperature, humidity, content of oxygen and carbon dioxide, but not smells which we usually perceive very differently. For that we would need a Personalised electronic nose. With introduction of new systems we have to ask where the border is when we should start supporting the deteriorating cognitive or physical abilities of individuals. It is necessary to distinguish between passive and active support. In particular the systems and tools determined for elderly users should have adaptive and learning features so that they can be adjusted to personal needs and motivate the user to certain activity.

In the paper we will discuss basic approaches to home automation in relation to self-sufficiency and good practice examples in more detail.

**Keywords:** home automation, self-sufficiency, Personalisation
Smart Textiles: How Can It Support Elderly People To Live Longer At Home? Research by University College Of Vives
J. Dessin
University College Vives, Research Center Cretecs, Bruges, Belgium

This research project of 4 years looks closely into the possibilities of all kinds of textiles as a carrier for technology. The aim of this project is one or more prototypes textile products which has technology in order to support

- Wandering behavior by people with dementia,
- (Automatically) measuring and communication of biomedical information for people with chronic diseases,
- Activity monitoring in order to prevent falling.

Keywords: smart, textiles, wandering, falling, telemetric

VoIP Platform: A Solution to Advance Communication Practices in Health Sectors
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The main objective of this paper was to come up with a practical Voice over Internet Protocol approach to support elderly patients affected by Alzheimer disease in their daily activities. This will comprise by enhancing and integrating the existing Open Source features. The whole development embroiled the integration possibilities of voice, video and instant messaging services in order to improve communication processes between local Session Initial Protocol servers and clients. Part of the proposed work is the remote control tab feature that will be used to control the robot machine and the Living lab framework for knowledge creation and sharing. The preliminary tests and developments have verified that Ekiga softphone running on robot machine can accept and direct orders from Asterisks server in a form of audio and video. The information was gathered through literature review and this was conducted through the use of case studies, white papers, peer-reviewed conference papers and journals.

Keywords: VoIP, Asterisk, SIP

Principles to Underpin the Use of Cameras and Other Surveillance Technologies in Care Settings
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This paper considers the use of surveillance technologies in care settings and the way in which they can help to protect older people. Such technologies are considered as falling within the wider range of assistive technologies of which telehealth forms an element. An ethical way forward is signaled for
the use of such technologies and the way in which the use of visual or audio information that is
gathered can be legitimised.
An important intention of the paper is to defuse some of the heightened rhetoric associated with
cameras and related concerns about personal privacy. A number of principles are put forward by
which, with appropriate controls, it becomes more readily possible to consider the use of surveillance
technologies by which appropriate balances between privacy and people’s safety and autonomy can
be achieved. Part of the key to this is in the way that information is gathered and stored and the way
that related consents, etc. are agreed around access to the same.

A Digital Pathway to Successful eHealth Deployment Supporting an Independent Living and Healthy
Ageing
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The Digital Pathway is a joint ecosystem, where a set of services are developed and tested in order
to ensure a smooth and – from a clinician and patients perspective – effortless implementation of
telemmedicine solutions.
The commercial goals for the project are to develop a tele-medical infrastructure with a set of
services, thus ensuring that the development and use of telemedicine will be more effective, cheaper
and better. The project is a PPI-project (public-private innovation) with participation from 6
municipalities in the region, hospitals, the region and the private partner. Many telemedicine projects
are successful and both the patients and the healthcare personnel consider them an improvement of
treatment as seen in the Whole System Demonstrator project. Despite the benefits however, few of
these projects are turned into successful and fully implemented solutions that are integrated into the
healthcare system. And as seen in the results from the Renewing Health project the business case is
often negative due to expenses related to the cost of the solution.
In the Digital Pathway project we have done a survey of solutions in the region and found costs
related to logistics, support, connections, interoperability etc. adding to the total cost of telemedicine
and e-health. Based on these results the Digital Pathway will provide an ecosystem for telemedicine
supplying a set of service supporting the solutions thus reducing the cost to the price of the actual
solution and thereby excluding excess costs related to support, logistics etc. The Digital Pathways
unique combination of technical infrastructure (such as data collection, data sharing and security)
and practical services (such as logistics and support) will help accelerate the use of ICT and health and
social care technology in frontline public service delivery. In fact, a recently published whitepaper
from Infoway (Canada Health Infoway, 2014) suggests that such a set of services is necessary to in
order to be able to implement and run telemedicine solutions on a larger scale. And by supplying an
infrastructure for telemedicine

Keywords: interoperability, standards, telemedicine, security, economics
Strengthening Self-Management of Stress in Older Workers through Advanced Technology Apps: The StayActive Project
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Nowadays, working environments are becoming more and more stressful and especially older people chronically exposed to such environments become prone to burnout, lesser productivity and onset of various illnesses. Thus, stress level evaluation and the design of Personalised batteries of interventions for helping the worker to better cope with stressors are under development. Advanced technology apps may be very useful in this respect. Their development as the second, non-human assistance segment of health systems is equally highly envisaged and challenging.

The StayActive project aims at providing older workers with a Personalised, adaptable app installed on a smart phone, able to monitor some stress relevant biological parameters and to recommend various relaxation activities “just-in-time”, thus empowering the users to cope with various work stressors without interfering with their normal activity.

In the current phase of the project, the needs and preferences of older workers for stress handling were detected through interviewing 38 voluntary workers aged over 55, half working in an office milieu and half in a factory-like one.

The results of this interview session provided several important insights: a satisfactory tech literacy level among the interviewed workers; differences between the two groups - “office” and “factory”, obviously due to their workplace profile; a higher vulnerability of “factory” people to workplace stressors; sensitive issues related to the GPS tracking outside the working time; a low awareness about stress and its effects. All these results will be used in the configuration of services to be provided and of the needed software/hardware infrastructure. The impact of the StayActive project envisages the increase of life quality of older employees at work, the support of managers for better handling the institutional stressors, and the contribution healthy ageing strategies.

Keywords: smart technologies, stress, older workers

Telemecine in Mecklenburg-Vorpommern: Challenges and Opportunities
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Objective: To give an overview of telemedicine projects in the last decade in a rural German federal state with low population density and discuss the current state of translation into regular services in the health care system.

Background: Mecklenburg-Vorpommern is a federal state in the North-East of Germany. Most parts of the state are categorized as rural area. With a mean population density of 69 inhabitants per sq. km it is the state with the lowest population density in Germany. With an area of 23.193 sq. km it roughly spans 80% of the size of Belgium but has only 1/8 in respect to the population. With a mean age of 45 years and 22.1 % of the population older than 65 (in 2014) this state has the oldest...
population in Germany. Telemedicine holds a great potential to overcome this structural challenge in providing expert knowledge independent of time and location and securing health care delivery for the population in the rural area.

The objective of this paper is to give an overview of telemedicine projects developed in this region and discuss the current state of implementation in day to day health care delivery.

Methods: Projects have been compiled by searching the internet, the German Telemedicine Portal, the eHealth@home map of the Institute for Work and Technology in Gelsenkirchen (IAT) and by personal contacts of the author.

Results: More than 20 unique projects have been identified ranging from a small study involving telemedical methodologies to several EU-Projects one of them led by a partner in Mecklenburg-Vorpommern. One project, a teleradiology network, managed to run on an economic basis after the funding period. The majority of projects have not been translated into a regular service in the health care delivery system.

Conclusion: Despite successful implementation of various telemedicine projects and the associated knowledge growth about telemedicine in the region, only few projects survived the end of the funding period and serve in health care delivery on a regular basis. The main reasons seem to be a lack of financing models, resistance or missing awareness of important stakeholders and the lack of reimbursement models from the federal lev

**Keywords:** telemedicine, rural area

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**Semantic Intelligence and Sentiment Analysis**  
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Some very important information is spread over many different sources of data. Some of the sources use natural language with a huge spectrum of terms and associations of terms named as expressions. The data sources can be patients clinical and discharge notes, prescriptions, adverse reactions reports and other relevant documents to healthcare services. The system should be able to live in the home with the patient in a home healthcare situation. There are some well-known taxonomies to classify the healthcare data, although the professionals prefer to use natural language and the extraction and classification of information is a hard task. Usually this task is conducted by nurses of assistants with a risk of misunderstood concepts and with a waste of time. The social networks and web 2.0 platforms can be a very important source of information if the data can be interpreted and transformed into information. Natural Language Processing is an important tool for discerning the meaning of value from the written word and the intonation. The terms and the expressions can be parsed but there are many different synonymous, acronyms, and idiomatic expressions that cannot be directly interpreted and must be processed by local evaluation. The semantic intelligence concepts and methods can be used to transform data into information. A new level of analysis is called semantic and opinion mining which can be inferred from the extracted information. The method proposed is based on annotations made by a group of experts that is used to train a neural network to extract information from a corpus of documents. The validation of this method was done with a set of documents and the neural network accuracy is significant. Future studies are being conducted
in some fields including hospital discharge notes analysis and statistics. The possibility of a National Repository exists and the ability to merge most of the EHR technologies out in the population of hospital information systems.

**Keywords:** eHealth, semantic intelligence, sentiment analysis

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**STAFF: Smart Technology in order to Avoid Fysical Fixation in care organizations. Research by University College Vives**

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The project places 10 Smart Technologies (from Belgium and the Netherlands) in 9 elderly care organizations in Belgium. The purpose of this research is to determine if smart technologies find their way in care organizations as an alternative for physical fixation methods. If so, what are the success factors? If not, where does it go wrong and what tips and tricks can we provide for the care organizations and technology suppliers. This is a very practical based research by University College Vives. We would like to inform other countries about the results and learn more about their experience in this topic.

**Keywords:** smart, technology, fysical, fixation, research

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**The Entry of Wearable Devices in Personal Health Monitoring: Positioning of Digital Service Providers and Telecom Operators**

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This paper analyzes the entry of wearable devices in personal health monitoring and its consequences. The strategy and positioning of some digital service providers and the Telecom operators are analyzed through the role of each player in the value chain. Today, wearable devices are progressing to become more suitable for personal health monitoring while, in parallel, cloud computing enables digital healthcare platforms to connect mobile as well as home sensors applications.

In the IoT, according to IDATE, 80 billion objects will be connected in the world within 2020. To analyze the entry of wearable devices in personal health monitoring and its consequences for the user, the service providers and the telecom operators, we used the following methodology: (1) First, to analyze the situation of this evolving personal health market, we build the value chain of the main actors, using a 4-blocks value chain representation. (2) Then, to analyze the business models, we used the A. Osterwalder canvas method.
The following Figure describes the value chain of wearables devices as thought by main actors like Samsung with its SAMI platform, Apple with its Health kit and Google with its Google Fit platform. In such a value chain, the major actors control the value chain by imposing their standards and selected devices to partners and developers.

Such a positioning will impact the role the user and the strategy of other actors like telecom operators.

In this paper, we think that in the near future, users will probably ask for some unification and interoperability of all equipment like mobile wearable devices, wireless health equipment and home automation equipment, all these equipment and devices being able to connect, through their internet account, to various services providers.

Keywords: mobile health, business model, Internet of things, wellness, wearable.
social links. In particular, it includes the provision, through a web platform tailored to seniors, all the services and information that is thus available at any time and from any location. A supply / demand forum service can offer to anyone (individual, caregiver, craftsmen, etc.) the possibility of proposing his own services, to ask for a particular service request, but also to dialogue with all the actors of the platform and the community.

Keywords: coordination, transversality, ageing, commercial centre

Promoting Innovation and Efficiency of Solutions for the Elderly through Intergenerational Workshops and Experimentation
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It is proven that isolation of people insidiously affects their quality of life. While modern technologies are available to all, elderly and isolated people often know neither the existence nor the features and even less the benefits they could find to recover or maintain their independence at home. Often, solutions designers have not bothered to evaluate, to end users, the real needs and the "transaction" is as unilateral as inefficient.

In Guéret in Creuse (center of France), we have chosen to fill these gaps by putting into action a true intergenerational policy to the benefit of all actors, not just a simple linking between generations, which although it has interests, often offers very limited impacts. The aim is to create an intergenerational collaborative working group between students from the "home automation and autonomy" degrees of the University of Limoges (The BSc “Home automation for elderly and disabled people” degree and the Auton’Hom-e international Master degree) and the elderly for which the solutions are designed. The aim is to promote innovative, useful, realistic and properly assessed ideas in terms of assistance and smart homes. The process would go on until experimenting on field to the end-users.

Besides the positive role that each of the actors can take, the elderly would find an interest, a social added-value and the personal pleasure to be associated with this collaborative approach by sharing their thoughts on their daily life and what they know and hope about the new technologies. The work methodology is based upon three axes:

- Meetings between actors will enable, on topics such as mobility, comfort, safety and independence for people, to detect the real needs of the users and settle projects plans;
- Collaborative work of students and seniors as part of an academic work will move forward together towards relevant and realizable solutions;
- Finally, it will consist in putting into action the results on the field among the participants of the focus groups.

These works will be supported by the local and regional media (radio, TV, journal and newspapers), and will be hosted at the Innovation Center of Guéret in Creuse.

Keywords: collaborative workshops, intergenerational, efficiency, experimentation
Innovative Home Automation-Based Usage of Light Bulbs and Modern Lighting Equipment for Assistance to Elderly at Home
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In the context of home support, technologies are available to give assistance and security to elderly. However, the proposed solutions are numerous, often specific to a single need and sometimes not compatible with each other, leading to difficulties of understanding, learning, training and acceptance for elderly. Moreover, they are generally expensive for people with small income.

In contrast, light, accessible and affordable for all, is known to have soothing and reassuring benefits. For example, light guide is used in hospitals for patients who sometimes get up in the night and therefore need assistance in these moves.

The proposed system is based on the concept of light as a wellness tool. This 'all-in-one' system can include various interconnected equipment (lights, control devices and sensors through Zigbee wireless technology for example). The bulbs can be used in a traditional way (associated with the switch used as the main command) or become a signaling or ambiance device by changing the color or blinking: the bulbs become so much more than just light bulbs. The main features provided by the complete system are: alerts (such as bright flashes or color changes of the light bulbs) in case of identified hazards, reminders (reminding to take medication or close a water or gas faucet) and light environments and ambiances (depending on the daily activities in terms of moment and place). The definition of the features and uses of light is playfully using a simple universal and unique interface. A smartphone or a touch pad will provide a simple and affordable application for all people. For example, this application will take the form of a color chart that helps to select the color and the type of behavior for each connected bulbs in the house. In addition, the originality of the system is that it will increase the range and impact of alarm functions by controlling various connected equipment such as detectors (smoke, gas, presence). Comfort functions will be easily enlarged by enabling a wide spectrum of customized scenarios through home automation and ICT terminals.

**Keywords:** light, security, ambiance, sensors, assistance

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Personalised Information Channel Companion for Daily Life and Home Support
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With the advent of new technologies, information, under many and varied forms, has never been so much present in our daily lives. While new generations grow up naturally with the information and communication tools and profile them to their uses and desires, the elderly have difficulty understanding and using them when they could be of great benefit in their daily activities and life. Modern information modes and channels now allow to be informed at scales ranging from what is happening in the world, in our most local territorial environment (region, state, town, etc.) to our own life close environment. Regarding the latter point include communication with relatives, but also communication and data exchange with local services and medical care, and, more closely,
environmental data of modern living (the temperature of the house, for example), and data from sensors for medical monitoring. Information flows are heterogeneous, both in terms of data rate and type of information and therein lies the difficulty. To get relevant benefit information, it is necessary to sort, select, and prioritize the information based on personal and customized criteria designed to reflect the desires, tastes, but also the potential emergencies of the person concerned in her environment.

The Eclip6 concept is based on the provision of a customized and dedicated information channel for which the user himself is both actor and beneficiary. At chosen key locations in the user’s habitat, the system will select at appropriate moments and times of the day the most useful and relevant information for the user. The information chain ensures confidential adequacy between the lifestyle of the person and the delivered information during the day. For each user, the information channel is customizable, allowing considerations of age, leisure, social life, housing and health of the person. The type of interface is depending on location and the type of information provided to the user. A change in the context (an alert, a call from the family) or a deliberate action of the user (to watch a TV channel) allows broadcasting on the same support at the same time and same place another type of information.

**Keywords:** Information channel, Personalisation, assistance, context

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**The Innovation Centre of Grand Guéret: A Community Tool to Boost the Sharing of Ideas and Pioneering Ventures**

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In Creuse, many actions are leveraging habitat technologies for people with loss of autonomy. Innovative academic courses on the silver economy have been put in place. Thus, the Grand Gueret, in the heart of Creuse in Limousin, has interesting potential tools (Home Automation Resource Center, Domotics Packs in people's homes, experimentation), but whose actions are often not implemented in synergy to be fully effective. The territory does not attract industry of the concerned domains, and end-users are seldom integrated into the loop.

Our project is inspired by the regional centers of innovation and technology transfer which are public structures for research and development. Their mission is to support companies in their search for profitability and competitiveness by raising awareness and helping to strengthen their technological and commercial potential. These structures however have for most of them the drawbacks of opening wide enough the profiles of the stakeholders, of staying too specialized in a field whose side effects would yet deserve to be enhanced and, hence, not emphasizing the experience feedback and optimal innovation cycles. We extend the concept by incorporating innovative approaches for detection of ideas, co-design, market research, training and applied research, in terms of types of actors and exchanges modes between the actors. The unifying idea is the third place. It is a central location that allows actors to meet on equal footing for mutual added value to the benefit of all. It incubates ideas from academics, local authorities, industry, users’ associations, end-users, and, more generally, to any individual who wants to interact regardless of age, social status and type of project he aims to
lead, with convergent and concerted goals. Intergenerational workshops are organized between students and the elderly. The structure houses a Fablab, PhD students, a business incubator, a start-up aid for the hosted innovative companies. Representatives of the various actors are the steering committee. The goal is to maintain intellectual richness and innovative initiatives in the territory at the societal and economic benefit of the population.

Keywords: code sign, innovation, project, interactions, benefits

Ethical and Non-Intrusive Uses of Robots to Assist People with Loss of Autonomy
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Age, accident and illness may, at any time, force all of us to face a situation of disability or loss of autonomy. Fortunately, we are now in a unique position because our time invites to technological solutions that push the boundaries of the possible. What if despite the physical limitations of a heavy physical disability we could maintain our home? What if we could still get around the inconvenience and the taboo of being dependent of an individual to satisfy our inner needs? What if, trapped in a wheelchair, we could still visit, and instantly all the places of our planet? Thanks to technological advances in the fields of robotics, many things can be made possible. If humanoid robotics has a huge range of possibilities, it is also a vehicle many phantasms such as that of the companion robot replacing the social and human relations. Another philosophy is, in a concern of ethics, of considerations of complex human-robot relationships and of technological relevance, to drive reflection towards artificial intelligence limited and targeted. The humanoid robot is not a partner or a friend or a mother; it can play a beneficial role by remaining a simple ergonomic remote control for deploying an action and without assistance. We have submitted the following ideas to elderly through intergenerational workshops and experimented the ideas with Nao. We have derived three main relevant roles for the robots. A first mission is a daily assistance as a butler, who can through voice recognition of your orders switch off the light, close the shutters, etc. This interaction will also obviously work together with home automation facilities. The butler can also detect falls and act by alerting the tele-platform hotline. The second mission of this wizard is an intimate assistance, allowing access to the intimate sexual needs with dignity and autonomy without the help of a third party for people with mobility problems. A third mission is that of the avatar that will allow people with mobility difficulties to virtually move, isolated to people to make a visit from their homes to their families. The robot can also be the projection of distant interlocutors at the home person’s home.

Keywords: robot, assistance, avatar, autonomy, ethics

Mobile Android Application to Help with Mindfulness Practice
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Mindfulness is a secular and scientific psychological technique based on meditation techniques from Eastern traditions. Several meta-analysis of publications have demonstrated its efficacy in many illnesses and in psychiatry, as well as its utility in healthy people, in order to increase their well-being and quality of life. Finally, it has been proved that its practice changes brain anatomy and physiology and reduces the vegetative system activity. The interest in mindfulness has extended in several fields: health, teaching, business. A previous review of the literature concluded that it is necessary to develop specific applications for mobile devices to support users and professionals in the practice of mindfulness. Specifically the app will be useful for helping people in rural area where usually there are no groups or networks to practice. This paper presents the first mobile application developed by professionals in Spanish and Portuguese languages to help users during the practice of mindfulness. It has been developed by an interdisciplinary team and tested during seven months in controlled groups. The results about quality, usability, user satisfaction and improvement ideas are presented in this work.

**Keywords:** mHealth, mindfulness, QoL, wellbeing
Mobile Phone Technology: A Boom for Interactive Telemedicine in Nigeria  
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Nigeria, with a population of about 178.5 million people, has over five hundred different ethnic groups, 250 languages, life expectancy of 47 years, median age of 19 years and about 1.04 males to every 1 female. The distance between the 36 states of the nation and between the rural and urban centers is alarming. Over the years, health has occupied huge and imposing position in Nigeria’s annual budgets. However certain obvious factors such as paucity of health experts, poverty, fast increasing population with no supporting economic growth and distance between health service providers and consumers have seemingly hindered the realization of the large investments in the health sector. However, the present introduction of mobile phones in the telecommunications industry has rapidly increased access to information and communication. Today, almost everyone in Nigeria owns a mobile phone. This makes it easier for the practice of interactive telemedicine services which provide real time interactions between patient and health service provider via phone conversations, online communication and home visits.  
The aim of this paper is to highlight the potentials mobile phones technology has in transforming the Nigerian health sector by providing health services to patients living in isolated communities and remote regions, reducing patients’ visits to health service centers, reducing overall costs of medical care, facilitating medical education and eliminating possible transmission of infectious diseases between patients and medical staff.

**Keywords**: mobile phone, boom, interactive, telemedicine

Social Media: The Power of Networking  
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Social Media has high penetration and impact in many countries including low income communities. Using it to promote, disseminate and discuss medical knowledge, initiatives, projects, research, news and other activities between peers has become one of the most powerful way of communication nowadays, more useful than the traditional methods.

**Objectives**: The aim of this communication is to offer an overview of the use and impact of Social Media in the network of European Young General Practitioners from 2 different perspectives: the use
of the social media networks by the Young GPs and the impact/reach/awareness of the activity develop from the official social profiles running by the European Young General Practitioners during the period 2012-2014.

Methods: Analyzing the use of Social Media (Facebook, Twitter, LinkedIn and YouTube) in Young General Practitioners network in Europe during the period 2012-2014 and the correlation with their activities will provide the clues of the effectiveness and success reaching the official channels in terms of community, engagement, education, innovation, impact and revolution that have been extended and copy as strategic model to improve the communication among peers in equivalents networks around the world.

**Keywords**: social media, network, family medicine

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**Malian Ministry of Health Digital Tools against EBOLA**

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The Ebola outbreak has been raging through West Africa since February 2014, with national authorities making formal announcements since March. Malian Government decides to strengthen its prevention and response by using of digital Tools in follow. All official information about the management of the outbreak is available on the MSPH website. The information has been available since the first case was reported in Guinea and is relayed to the MSHP official Facebook page and other social media, making it available to more than 10,000 users in Mali.

Since the onset of the Ebola virus in neighboring countries, the Ministry of Health through the National Agency for Telehealth and Medical Informatics (ANTIM) has spared no effort to inform and educate the population to avoid the penetration of the disease on Malian soil. In addition to all these measures mobile telephone numbers have been made available to the people of Mali by the Green, Orange and Malitel companies to provide more information and answer questions regarding the Ebola virus. This is complemented by a dedicated communication system exclusively for Ebola health professionals called Ebolaphone. The electronic alert system for Ebola is an application developed for mobile phones that allows real-time trace data for Ebola and all diseases of epidemic potential. This application is a digital display interface called Digital Integrated Health Information System (SNISI) and is installed on phones responsible for Health Information System at the District. It is integrated into the implementation of the Integrated Disease Surveillance and Response (IDSR).

**Keywords**: Ebola, ICT, digital health, IDSR
Organization of Telecardiology in the Nenets Autonomous Okrug
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Cardiovascular diseases are the leading cause of mortality. Acute coronary syndrome survivability depends on the time of the beginning a specific therapy. There is an order № 918н of the Ministry of Health of the Russian Federation "On approval of the procedure for providing medical care to patients with cardiovascular diseases" adopted 15 November 2012. The implementation of the provisions of this order in the Nenets Autonomous Okrug is complicated by the geographic features of the region: the remoteness of settlements from the center of the region, the absence of ground transportation in the region, irregular air transportation.

Proposals for improving the quality of medical care in cardiology with the use of telemedicine technologies were developed by the Nenets Regional Hospital as follows: the list of organizational and therapeutic measures; the questionnaire to collect anamnesis of patients with suspected ACS; the list of mandatory first aid measures; clinical situations for mandatory registration and transfer ECG to the Nenets Regional Hospital; the list of mandatory diagnostic measures; indications for thrombolysis; mandatory list of medicines; Pain Assessment Tool (ACS).

In the framework of the Russian-Norwegian project "Quality improvement of medical care of the indigenous population of the Nenets Autonomous Okrug" were purchased and delivered in the medical institutions of the remote settlements of the Nenets Autonomous Okrug 3 sets of diagnostic equipment (electrocardiograph with remote data transmission, portable coagulometer). In the course of two months there were 23 telemedicine consultations using this equipment and identified 1 patient with ACS requiring urgent hospitalization. Nine times therapeutic approach and treatment were corrected.

Keywords: telecardiology, ACS, teleconsultation, NAO
Background: The Veneto Region Social-Health plan quoted that it is necessary to pay more attention on the area of chronicity and there is, therefore, the need to define a new models of care characterized by an integration of health and social care. Following this the Veneto Region carried out a unique platform where the telecare and telehealth services are integrated. With this platform the clinical data and social needs of chronic patients are monitored directly from their home. During RENEWING HEALTH European project, for the patients affected by Congestive Heart Failure (CHF) a Randomized Controlled Trial is been performed in order to assess if the provided service improves the clinical and economical outcome in the favor of the group of patients followed with the telemedicine services.

Results: The telecare and telehealth services are provided in a unique platform to monitor CHF patients. The patients are equipped at home with emergency button and portable devices for real time detection of emergencies and for measure their clinical data in agreement with plan of their clinicians. Clinical data are transmitted from patient’s home to eHealth regional centre and managed by trained operators. The operators detect the alarm and inform the clinicians when it is necessary. The telecare service monitor the patients for 24/7 real time detection of emergency situations at the patient’s home and makes scheduled control calls to monitor the patient’s life conditions and quality of life. The distress call is addressed directly to the Regional Centre, where operators manage the situation calling the patient or his caregiver and, if necessary, putting them in contact with the ER department or Social Services. This integration is been assessed and the results show that at twelve months follow up statistical significance is reached for the primary end point: all-cause death + new hospitalizations for heart failure. With regard to some secondary end points, i.e. the number of hospitalizations and the number of procedures for CHF, we observed a statistically significant reduction in favor of the intervention group. Saving for the intervention group was about 900€ per patient.

Keywords: telehealth, telecare, HTA, evidence, benefits

Integrative Prevention of Cardio-Metabolic Risks in Rural Areas with Telemedicine
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The objective of this paper is to inform about the results of a new regional preventive program designed for the early detection of major cardiovascular and cardio-metabolic risk factors both in cities and in rural areas with specific focus on lower limbs perfusion and the corresponding improved chance for the patients to reverse the pathological processes in time. The program is a result of a new model co-operation between healthcare providers of several rural areas, companies operating in telemedicine and funding providers. Longer term sustainability as one of major objective was reached and the basic economic parameters are also discussed.

Keywords: cardiology, PAD, atherosclerosis, diabetes melitus, rural telemedicine sustainability
Audit of Emergency Electrocardiograms from a Brazilian Large Scale Telecardiology Service
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The Telehealth Network of Minas Gerais (TNMG) is a public telehealth service in Brazil that assists the primary care of 722 cities, performing telediagnosis, including electrocardiogram (ECG) analysis and teleconsultations.

From February to March 2014, 28% of all ECGs were sent as “emergency” by the primary care telehealth sites, an unexpected indicator. Our hypothesis was that a great number of ECGs were incorrectly classified, what may delay the assessment of the real emergency ones. Our aim was to investigate the reasons for the primary care practitioners to send a high number of emergency ECGs, to implement corrective actions, and to assess the impact of these actions.

This is a quasi-experimental study. In the 1st phase, all ECGs performed in the care units that sent >70% of ECGs as emergency from February to March 2014 were selected. The 2nd phase consisted on telephone calls to the 63 telehealth sites selected on the 1st phase to investigate the criteria adopted to classify a case as an emergency. Primary care practitioners were informed about the criteria from Brazil’s Federal Council of Medicine to classify an exam as emergency, and an e-mail with reinforcement information was sent to each practitioner who was contacted. In the 3rd phase, the proportion of ECGs sent as an emergency on the 1st and 2nd months after the intervention was assessed.

Chi-square tests were performed to compare baseline, 1st and 2nd months. Of the 63 cities, nurses and nursing technicians were responsible for 92% of the ECGs, and 50% of the practitioners did not know the proper definition of an emergency. After the intervention, 67% of the cities had a significant reduction of the proportion of ECGs sent as an emergency on the 1st month, and 17% had a significant reduction on the 2nd month.

This study demonstrated that many professionals responsible for ECG exams on the primary care units of remote cities do not know the correct criteria definition of emergency, and that a simple intervention as a telephone call and an email may be effective in reducing the proportion of ECGs incorrectly classified, proving the educational role of telehealth activities.

**Keywords:** telehealth, telecardiology, primary healthcare, electrocardiogram

Information, Safety and Quality of Life in Patients with ICDs: Remote Vs Standard Follow Up: A Comparative Study
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Introduction: The increase of people undergoing ICD implantation monitored at a distance has placed the emphasis on the centrality role of nurses in the management of these patients. The nurse takes care of the patient by monitoring, more frequently than in the outpatient management, the clinical course, the psychological asset and the quality of life.

Objective: To explore the perception of patients undergoing ICD implantation and monitored with remote control in reference to three main categories of nursing competence: information, safety and
quality of life. This survey is part of the "3 C Project" (To Cure To-Care-To Cope), taking place in the Cardiology Division of the United Hospitals of Pinerolo, based on multidisciplinary collaboration (doctors, psychologists, nurses) and which has, among its objectives, to test the efficacy of a new way of care given to these patients and their care-givers.

Materials and Methods: The sample was composed of 98 patients: 48 patients of Group I, with remote control and 40 of the control group (outpatient standard follow-up, Group II). A multiple choice questionnaire of 20 items, has been administered to evaluate the effectiveness of remote monitoring than outpatient and the level of patient satisfaction in three different areas: information, safety and quality of life.

Results: The data showed a better level of satisfaction in patients remotely monitored (Group I, 89%) than in patients of the control group (standard follow-up, Group II, 71%), with an average value of the score of 3.83/5 (compared to an average score of 4.45/5 for the Group I). In the comparison of the two groups being investigated, relatively to all areas explored, the Group I has reached higher values than the control group. The results show that the more frequent contact with the professionals and the greater interaction through the use of new technologies has favored the effectiveness of more in-depth information, an acquisition of a greater safety and a better recovery of the quality of life by the patients. Furthermore, they put in evidence the central role of the nurse in the control procedures at a distance.

**Keywords:** ICD, nurse, remote, psychological, QoL
Interoperability in Nursing in Poland: The Way for Implementation of ICNP into Electronic Health Record
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Introduction: In April 2014, European Commission presented four reports describing major areas for action digital initiatives in Europe. They describe few goals for development of e-health in Europe: good practices across Europe in which they show how ICT can help to get better access to Healthcare, increasing the interoperability among eHealth solutions and health systems, ensuring that patients have access to their electronic health records and a wider use of telemedicine services. In all this areas Nurses play significant role.

In Poland e-health is under development. For better coordination Ministry of Health established special Agency, this is responsible for interoperability in health system in Poland. And nurses are working there to develop new solutions for health system.

Purpose: The purpose of this presentation is to report on the work of the Implementation International Classification in Poland in the education and practice.

Results: Nurses started to work widely for in 2005 under umbrella the Polish Nurses Association, and many initiatives have been done during last few years. The results of few studies, ensuring the leaders that nurses need to implement tools for collect information about their practice. The most important for e-health and patient safety is implementation common language in nursing. International Classification for Nursing Practice is the tool, which will help Nurses to collect the information according to International Minimum Data Set (I-MDS) for public policy planning. This presentation outlines the key steps and considerations for the design and delivery of eHealth services for patient safety in Poland, in nursing.

Conclusions: It should be of interest to policymakers, health professionals, and other stakeholders, especially business partner, who have a role in the design or deployment of eHealth services, to implement nurses recommendation into practice and help them to measure quality of care.

Keywords: e-health, Nursing, Classification, Health Care

The Provision of Complex Clinical Support by a Pharmaceutical Company
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Communicating complex scientific and medical information is an effort that must be carefully constructed and delivered to have a meaningful impact on clinicians. In a non-promotional pharmaceutical setting, the provision of fair and balanced, accurate, and timely data in response to
healthcare professional requests represents a convergence of human talent and robust information technology.
This presentation will discuss best in practice methods to develop and communicate scientific responses for a global healthcare audience; the necessary collaboration of Registered Nurses, Medical Doctors, Pharmacists, and Scientist; as well as the information technology for content management and interaction tracking. Innovative Medical Affairs departments in pharmaceutical companies are leveraging multiple resources to best accommodate the particular clinician preference. Resources include modern international call centers and email, as well as more sophisticated methods such as live chat and web based support; all of which provide an important platform to provide this information. Challenges include harmonization of a global code of conduct respecting differences in language and culture, revising content specific to a leading edge and evolving areas of clinical concern, and minimising the gap between countries with well-established healthcare systems and emerging populations. Methods of global interactions are addressed in business literature, articles on nursing care, as well as pharmaceutical industry journals. However, it is the synthesis of these areas of expertise that provide a unique insight on best practices and perspectives on the future. It is clear that exceptional human talent empowered with reliable and capable information technology tools are at the heart of the solution. It is relevant to continue the discussion on best mechanisms to provide consistent, up to date, and balanced clinical data to a global audience.

The WATCH Program: Women with Arthritis Taking Control of their Health
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Arthritis is one of the most common long-term chronic health conditions worldwide, causing considerable disability for individuals and significant costs for health care systems. Although it’s well known that exercise can improve function in this population and prevent co-morbidities, exercise programs for those affected are limited. Moving beyond brick and mortar, the WATCH program offers Internet-based, live streaming videos that can be viewed in the comfort of one’s home, delivered by a certified gerontology nurse practitioner. This 30-minute program incorporates stretching, strength, balance and mindfulness, and is specifically designed for middle-aged women with arthritis. Over two-thirds of people with arthritis are younger than 65, with a prevalence higher among women than men in every age group. By targeting this specific population, interest can be maintained with topics and content that are appealing to women, delivered during the daily broadcast. If participants are unable to attend live, they have access to the daily webcast, accessible for a 24-hour period.
A three-month pilot is in process and will provide data regarding population interest, engagement, and accessibility. Measures of health outcomes, pre- and post-intervention, will include data related to pain, sleep, and quality of life. A HIPPA secure VIDYO platform supplied by Virtual Care Works (VCW) will be used and participants will be able to interact with each other as well as the nurse practitioner during the live sessions via a secure chat. If successful, this program can be easily scaled utilising a growing number of advanced practice nurses internationally.
In Our Hands, RN Tele-facilitators Forward Patient Assessments: How Collaboration Is Vital To Telemedicine
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With telemedicine changing the landscape of how subspecialty care can be provided, nurses have more opportunities to broaden their skills and use their expertise in an underserved, outreach clinic setting. A normal day for an RN in a multispecialty clinic has transitioned from nursing tasks such as vitals, education, and procedures to being a vital collaborator of the provider at the distant site. Children’s Mercy RN telefacilitators receive extensive training with the subspecialty providers they facilitate for to be able to share the physical pieces of the provider assessment at the near site. Patient satisfaction scores remain high by utilising this time saving, cost efficient model that decreases travel and time on both ends of the appointment, while maintaining a Personalised visit via the team approach. The RN, who lives and works in rural locations, is employed by and trained at the same academic institution that providers are practicing from, thus removing the barrier of professional isolation and enhancing the care given to the patient.

Diagnostic Reasoning in Telephone Triage by Registered Nurses (RN): An Exploration of Decision Making in Uncertain Conditions
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Various theories have been advanced that speak to decision making in the practice of telephone triage, and yet the process is still poorly understood and occasionally fraught with controversy. Although there is increasing recognition of the appropriate role of decision support tools, nurses are still unclear about what, exactly, they are supposed to be doing if not following the protocols to the letter. Of course, patient safety must come first, although some practices common to telehealth nursing promote conformity and control of the nurse’s thoughts and actions over independent clinical judgment.

As the role of telehealth nursing grows and expands in its scope and responsibilities, our use of critical thinking must increase as well. However, how does this process work? In traditional healthcare settings, the RN has at least a working diagnosis for each patient or is working in close partnership with a provider who is responsible for seeking the diagnosis. However, in telephone triage, the patient’s diagnosis, which usually guides our nursing care, is absent, forcing the RN to look to different critical elements in decision making.

The focus of this presentation will be to look at the decision making process in telephone triage with a goal of encouraging professional nurses to take a fresh look at the processes we use in helping patients formulate an appropriate and safe disposition. The role of critical thinking, the appropriate use of checklists, and the process of diagnostic reasoning will be explored.
TeleDOT: Directly Observed Therapy for Tuberculosis Using Telehealth
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Auckland Regional Public Health Service (ARPHS) is responsible for TB treatment supervision, including directly observed therapy (DOT) in Auckland region. Daily DOT for people with tuberculosis (TB) is the optimal recommendation of the World Health Organization. Some people can self-administer their drugs with education, regular review and nursing supervision. However the increasing evidence for, and recommendations to use daily dosing, is resulting in more people requiring daily DOT. The aim of the TeleDOT project was to increase the number of ARPHS' TB clients able to receive DOT within current nursing staff levels by taking a client-centred approach to using new technology.

The project began as a foundation study coordinated by one of the public health nurses and aimed to have ten clients receiving DOT remotely. Eligible TB clients, entered into formal agreements to participate. Formative and summative evaluations of the TeleDOT study were completed, using a variety of methods to capture qualitative and quantitative data. TeleDOT proved to be an effective, efficient and sustainable means of providing DOT to clients. A 10% increase in the number of clients receiving DOT within existing nursing staff resources was achieved.

At the end of 2013, TeleDOT was transitioned to business as usual alongside traditional face to face DOT. Since transition to business as usual, TeleDOT has been increasingly well accepted by staff and clients and is now an integral part of ARPHS’ TB medicine delivery mechanisms. The technology has quickly progressed from initially using video telephones to using software applications downloaded onto clients’ personal computers or mobile devices.

The TeleDOT project demonstrated the potential for technology to improve treatment delivery to TB clients and achieve sustainable cost and other resource efficiencies for ARPHS. Nurses play a key role in driving the use of emerging technologies which improve service delivery models while achieving positive outcomes for clients and the public health workforce. The need to continuously improve the quality and efficiency of client care within the context of a challenging economic environment drives the adoption of new technologies.