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Ljubljana, 12 September 2019



Book of abstracts

Editors:

Andrej Starc, Marija Milavec Kapun, Jelena Ficzkó

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3rd International Scientific Conference HealthOnline
DIGITAL TECHNOLOGIES AND HEALTH ECOSYSTEMS
 Ljubljana, 12 September 2019

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Where are the hidden traps in big healthcare data?

Vladislav Rajkovič^{1,2}

¹ University of Maribor, Faculty of Organizational Sciences, Kranj, Slovenia

² University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

Correspondence: vladislav.rajkovic@gmail.com

Abstract

There is a general belief that useful knowledge is hidden in big data and that we only need to extract it. For this purpose, several modern methods of artificial intelligence are at our disposal. The quality and usefulness of this knowledge is not self-evident. It heavily depends on the quality of data, as well as on the methods and approaches used. There are hidden traps in the data itself, as well as in the approaches used.

We will analyse two problems: (1) predicting spread of influenza-like illness (ILI) and (2) the problem of predicting therapy based on data from past decisions made by physicians. In the first case, Google is abandoning the Google Flue Trends (GFT) service, and in the second case there were significant differences in decisions made by physicians in similar cases. These differences originate in different doctrines and in inconsistent ways of how they were applied.

For predictions, GFT used collected data on the incidence of ILI in the past. The actual data, which were obtained by a two-week delay, were closely matching the forecasts. The system predicted the spread of ILI almost in real time. This functioned exemplary for many years and made an important contribution to public health. Then, suddenly at one time, the accuracy of their forecast collapsed. GFT predicted twice the incidence than it actually was. In predicting ILI, there was a problem of conceptual drift, which is caused by the nature of these diseases, as well as the use of data that was too distant in time.

In the second case, we encountered the issues as they occur in the human decision-making process. Comprehensive data on individual patients and their symptoms were collected together with the decisions of physicians on therapies. Based on the analysis of these data, predictive accuracy was surprisingly low. The reasons for this were sought in various doctrines. The possibility of inconsistent consideration of patient information in the decisions of physicians was not excluded.

In both cases, it is important to first recognize the traps, and secondly to apply a problem-solving strategy combining several system approaches. The fact is that we live in an ever-changing world where unexpected events happen. Data describe past events. Conceptual drift may increase if the data analysed is too distant from the present.

When using machine learning methods to learn that knowledge in data is overly inconsistent, we may apply other artificial intelligence methods, for example expert systems. With the direct articulation of knowledge, they provide an explicit, transparent presentation of the knowledge of a certain field and are helpful in the decision-making process.

Keywords: healthcare, big data, data analytics, artificial intelligence, hidden traps

Health status of interacting entities in the digital knowledge landscapes

Srećko Gajović

University of Zagreb School of Medicine, Croatian Institute for Brain Research, Zagreb, Croatia

Correspondence: srecko.gajovic@hiim.hr

Abstract

Introduction: The digital society modifies the behaviour, perceptions and attitudes of the individuals seeking for health. To individual users the digital environment offers an innovative space to find the ways to stay healthy and combat illness. This interactive space was conceptualized as digital knowledge landscapes.

Methods: The interdisciplinary Navigating Knowledge Landscapes network (<http://knowledge-landscapes.hiim.hr/>) was organized to understand digital health and provide a conceptual framework on person-centered care in the digital society.

Results: In this contribution, I will discuss the embodiment and dis-embodiment of the digital entities engaged in health interactions. The knowledge landscapes are three-dimensional representations of the virtual space encountered when individuals use the digital technologies in their search for health. The knowledge represented is in this space in various and ever-changing contexts. The spatial and temporal dynamics of the contexts make on-line interactions puzzling, the knowledge being accessible and hidden at the same moment. Through interactions with the digital entities, the user's experiences shape and provide contexts for the knowledge to be understood and applied.

The digitization of these interactions, virtual in their nature, implies that the human entities would require digital identities to navigate knowledge landscapes representing the dis-embodiment (digitization) of the human participants. Together with human participants, various forms of non-human entities are to be encountered and they also actively shape the landscapes. The entities vary from active embodiments seeking a human identity (e.g. digital bots) toward more abstract and “un-touchable” forms of algorithms and artificial intelligence applications.

Discussion and conclusions: To be able to interact, all these entities relate to health, aspiring to settle themselves in the complex ecosystem of knowledge landscapes. Their human or non-human origins get blurred in the digital environment, allowing them to acquire their virtual health status. The health status of these entities in the digital realm, creates the contexts affecting the health status of the interacting humans in the off-line (“real-life”) settings.

Keywords: digital society, health, embodiment, knowledge landscapes

Digital health innovation based on the national eHealth platform

Mate Bešek^{1,2}, Peter Eklund³

¹National institute of Public Health, Ljubljana, Slovenia

²IT University of Copenhagen, Copenhagen, Denmark

³Deakin University, Geelong, Australia

Correspondence: mate.bestek@nijz.si, peter.eklund@deakin.edu.au

Abstract

Introduction: The national eHealth infrastructure in Slovenia has been evolving since at least 2011. Since then, we have been able to implement several national eHealth services to a high maturity level. In terms of digital platforms, we have established a set of core central services of the national eHealth digital platform. We have also managed to onboard the complementors that have extended the core services into many different solutions. Primarily, these are solutions that are used in existing work practices within the national health system. However, we have observed that the national eHealth is not yet truly an open platform that would support the extension of the core services into new and innovative solutions, which address the problems and the needs of the health system.

Methods: In this study, we focus on one aspect of enabling such digital innovation on the national level within the health system. Recent analysis has shown that the health system in Slovenia considerably lacks human resources with proper competences. For this reason, we have focused on this issue by studying how other EU countries have tackled this issue.

Results: The result of this study is a proposition for a social artefact that would have an important role in raising the competences in the health system. The focus are competences in the field of digital health.

Discussion and conclusions: This will contribute to entering a new era of national eHealth that would support digital health innovation based on the national eHealth platform.

Keywords: eHealth infrastructure, digital platforms

Digitalisation and informatisation of healthcare system in Croatia: learning from others' experience

Marija Spevan, Eli Šuperina Mandić, Vanda Malle, Sandra Bošković, Marija Bukvić, Kata Ivanišević, Amir Muzur

University of Rijeka, Faculty of Health Studies, Rijeka, Croatia

Correspondence: marija.sp88@gmail.com, eli.superinamandic@optinet.hr, malle.vanda@gmail.com, sandra.boskovic@uniri.hr, marija.bukvic@uniri.hr, kata.ivanisevic@uniri.hr, amir.muzur@uniri.hr

Abstract

Introduction: The information system currently used in the everyday practice of Croatian hospitals, ambulatories of general practitioners, community health care facilities, pharmacies, and other health care institutions, is far from being on a satisfactory level: it is generally highly bureaucratized, the system units do not communicate between each other adequately, and the process of health care service quality suffers. In the UK, for instance, the aim has been set to fully avoid using paper in hospitals by 2020. Overall computerization is supposed to alleviate the position of both patients and health care system employees, enable better communication, offer improved health care service, and above all, increase the general level of satisfaction.

Methods: We conducted a review of the relevant literature published within the last ten years (2010-2019) in the Medline database. We searched for accounts of positive and negative effects of health care system digitalisation and computerization on treatment errors, waiting lists, communication between health care providers and patients, patient safety, personal data protection, and other relevant parameters.

Results: In March 2019, Croatian Health Insurance Fund reported that it had secured the means to speed up the process of computerization of the health care system by introducing e-patient-dossiers and e-orders by 2021, thus shortening waiting lists for medical examinations. In Slovenia, it is said that the health care business model largely failed to integrate ICT into its operational context. In Germany, it also seems that the degree of digitalisation in health care is low when compared internationally and with other German industries. A more general study concluded that successful implementation of new technology requires organisational and collegial support.

Discussion and conclusion: Although digitalisation and computerization have proved to result in an overall increase in economic efficiency of a health care system, the process of digitalisation brings certain risks related to the collision of inherited technologies with a new complex organisation and performing structures, as well as to limited resources and other social and political phenomena. Our analysis of pros and cons of digitalisation and computerization experiences in various European health care systems has revealed the expected benefits but also certain specific ethical dilemmas. From the findings we have concluded that for a system to achieve success in the digitalisation process, it should pay attention to health care system users and providers, to the protection of privacy and the improvement of safety, and to the increase in interoperability and transparency. It should also foster the inclusion of health care providers in the design and performance of the digitalisation process.

Keywords: digitalisation, hospital, health care system, health care, health care providers

Analyses of the eHealth solutions' usage in Slovenia

Živa Rant, Dalibor Stanimirović

National Institute of Public Health, Ljubljana, Slovenia

Correspondence: Ziva.Rant@nijz.si, Dalibor.Stanimirovic@nijz.si

Abstract

Introduction: The project of digitalization of the Slovenian health care system (eHealth) was managed by the Ministry of Health of the Republic of Slovenia from 2008 to November 2015. It was one of the largest national information and communication technology projects in the Slovenian history and was co-financed by the EU under the European Social Fund. National Institute of Public Health (NIJZ) took over the governance of the eHealth project solutions on 1 December 2015. eHealth should integrate all fragmented information systems and provide relevant medical, economic and administrative data, which could assist increasingly important evidence-based decision-making and management in the health care system. This paper explores the current state of the most significant eHealth solutions in Slovenia and specifically focuses on different aspects of their usage.

Methods: We analysed Slovenian eHealth solutions from the usage aspect. In-depth analysis of the year 2018 included a review of the eHealth-related sources and structured discussions with the experts responsible for the development and implementation of the eHealth solutions and real statistical data from of the usage.

Results: The research has revealed that significant progress has been made in the last three years and that the short-term objectives of the eHealth solutions have been met almost without exception. ePrescription is the national eHealth solution established for the electronic prescription and dispensing of medications. The share of ePrescriptions in total of all prescriptions was between 92% and 94%. eAppointment is the national eHealth solution, established for the eReferrals, on-line booking of appointments and waiting lists. The share of eReferrals in the total of all referrals was between 93% and 97%. The number of on-line appointment bookings has been rising quickly during the last years. The Central Registry of Patient (CRPD) is a database of the eHealth documents for residents of Slovenia, which focuses on the collection of data exchanged between health care providers and storage of documents, which should be available to patients. A significant rise in the use of patient health documentation and Patient Summary (PPoP) in CRPD was recorded in 2017 and 2018. The national patient portal zVEM provides patients with safety access to their data in eHealth solutions in a one-stop shop manner.

Discussion and conclusions: As part of eHealth, NIJZ has taken over the governance of 20 eHealth solutions, the majority of which having already been implemented on the national level. NIJZ has been facing different challenges while trying to introduce the solutions into the health care environment. However, the general success in the implementation of innovative eHealth solutions in Slovenia was recognized also by the European Commission. Namely, Digital Economy and Society Index Report placed Slovenia at the sixth place in eHealth Services for 2017. However, in order to further exploit the potentials of eHealth in the future all efforts behind this project will have to be supported by systematic measures on all levels and by a firm commitment of stakeholders.

Keywords: eHealth, ePrescription, eAppointment, Central Registry of Patient, Patient Summary Record, patient portal zVEM

Challenges of prevention in traditional and new media

Matej Košir ¹, Sanela Talić ¹, William Crano ²

¹ Institute for Research and Development “Utrip”, Grosuplje, Slovenia

² Claremont Graduate University, Claremont, USA

Correspondence: info@institut-utrip.si, sanela@institut-utrip.si, Swilliam.crano@cgu.edu

Abstract

Introduction: Media could also serve many roles in prevention. It can help set the social and political agenda (e.g. why evidence-based prevention is important, the need for investment in prevention services, warnings about safety and threats to public health). It can also serve to coordinate prevention efforts that operate in the multiple micro- and macro-level settings throughout a community. Such multi-component efforts can be more powerful than single-component prevention interventions. Mass media has many characteristics that make them attractive for prevention, but is rarely or almost never used in an effective way, based on theory and scientific evidence.

Methods: Successful campaigns and other interventions (e.g. in school and families) depend on the theories that guide individual attitudes, intentions, and behaviours, specifically substance use (including alcohol and tobacco). These theories set the stage for intervening with persuasive messages that can serve to reinforce drug non-use, discourage continued use for those who have started, or encourage and guide users to addiction treatment and recovery services. Use of existing theoretical knowledge is the key for success in media-related prevention interventions. The author will present some of the most commonly used theories in media-based prevention.

Results: What is the available evidence in support of media-related prevention interventions (e.g. campaigns)? The developers of the international prevention standards found several reviews of research literature on the effectiveness of media campaigns. The strongest findings came from those studies that examined tobacco use; however, there were no similar findings for alcohol or other drugs. The reasons for this lack of evidence are mostly based on the challenges of conducting rigorous evaluations of media campaigns. An important fact to keep in mind is that research on the issue of persuasion, and how it relates to influencing various types of behaviours, has been ongoing for the past 50 years. There is empirically based knowledge about the best ways to persuade, and how to construct persuasive messages that can effectively impact attitudes and behaviours.

Discussion and conclusions: However, unfortunately, many media campaigns do not use this information on effective persuasive methods. Instead, they rely ideas that might seem to be intuitively a good idea, but have no basis in theory or evidence. Some characteristics of campaigns with positive outcomes based on international prevention standards will be presented by authors. There is also research and evidence for why certain media campaigns fail. Some of the reasons will also be presented at the conference.

Keywords: prevention, media, theory, evidence, standards

PeTh computer system as a therapeutic aid in physiotherapy of children with cerebral palsy

Sandra Bošković¹, Boris Najdanović²

¹ University of Rijeka, Faculty of Health Studies, Rijeka, Croatia

² Special hospital for the protection of children with neurodevelopmental and motor disorders, Zagreb, Croatia

Correspondence: sandra.boskovic@uniri.hr, borisnaj@gmail.com

Abstract

Introduction: The development of computer technology showed the possibility of its use in physical therapy for children with cerebral palsy. Because these technologies have existed for a relatively short time only a few professional and scientific works have been published in the field. Previous studies used published computer programs such as video games as a computer-driven tool in physiotherapy. The appearance of sensors tracking movement developed for game consoles that are widely used today (Microsoft Xbox, Nintendo Wii) pointed to the possibility of interaction with the computer without standard computer peripherals such as a mouse or a keyboard. In Croatia, a computer system has been developed for computer-aided training of children with cerebral palsy named PeTh (Personal Therapist). It is based on Microsoft's Kinect motion sensor and an original Croatian developed computer program for use with a sensor.

Methods: The purpose of this research was the valorisation of implementing this computer-driven aid in physical therapy for children with cerebral palsy. The research was carried out on six male children aged 9-15 years with cerebral palsy who reside in the day hospital school department of the Special Hospital for Children with neurodevelopmental disorders. The subjects exercised three times a week for a period of 30 days with a break over the weekend. In addition to the therapy, they also underwent therapy according to the Bobath concept three times a week for 60 min, which was their continuing treatment.

Results: This study has shown improvement on the GMFM test of motor abilities for each respondent. Body scheme awareness also improved as well as the quality of the use of upper extremities. There was also a higher degree of respondents' improved attention focus compared to other therapies they had attended. Results indicate a large potential of this computer-driven tool for the treatment of children with cerebral palsy.

Discussion and conclusions: The review of recent studies has shown that they mostly deal with the analysis of virtually powered aids for children with cerebral palsy, which are based on motion sensors for commercial computer games. A program that provides a high level of personalization for each subject has been used in this research and the results have shown a recovery of body parts by means of a feedback system with a computer system for all subjects during exercise because the subjects monitored visual and voice instructions from the screen and independently corrected the position of the bodywork to which they were warned by the system. It may therefore, be assumed that this kind of exercise improves the octo-motor coordination and that was not studied by previous studies. You et al. have found that the use of virtual computing aids leads to neuroplastic changes and reorganization in the cerebral cortex, which improves the activities of the everyday life of children with unilateral cerebral palsy. By implementing this system of associated heart rate monitor sensors, comparisons could be made with the research conducted by Robert et al. who investigated the increase in cardiac rhythm while playing video games in children with cerebral palsy in relation to the control group of children without cerebral palsy. In conclusion, it is necessary to carry out further research on a larger sample in order to prove its effectiveness further, as well as target motor and sensory aspects in children with cerebral palsy. However, children with cerebral palsy generally lead

an inactive lifestyle. For this reason, using the PeTh system at home could have a great effect on maintaining an active lifestyle and preserving psychophysical functions.

Keywords: PeTh System, Microsoft Kinect, cerebral palsy, children, video games.

Digitally coordinated outpatient care: the added value through the eyes of health care professionals and patients

Julij Šelb, Tomaž Hočevar

Parsek informacijske tehnologije, Ljubljana, Slovenia

Correspondence: medicalteam@parsek.com, Tomaz.hocevar@parsek.com

Abstract

Remote patient monitoring with tele-case management, an approach that can easily be covered with Vitaly's Managed Care functionality, is a modality of telemedicine in which disease specific parameters are monitored remotely and patient's management of the disease of interest is then modified accordingly. This kind of approach has shown tremendous health benefits in diverse fields of medicine, ranging from cancer, heart failure, diabetes (type 1 and type 2), hypertension to postoperative care and also to other disease settings.

The first implementation of the Managed Care functionality is within the NHS cancer follow-up programme for breast, colon and prostate cancer. These are 5-year follow up programs after the active treatment of the disease is finished. The purpose is to monitor patients' health condition via radiology exams, lab tests, or questionnaires in order to detect any disease recurrence.

With the Vitaly Managed Care solution, the care team acquires a better overview of the patient. All information pertaining to the follow-up programme is accessible from one place. The list of patients is updated with inputs from various sources and the health care professional can filter and sort the list to see which patients need to have their results reviewed in the upcoming week, for example, and thus better organise their work.

The patient has all the necessary information available on the portal, including educational materials and information on their next appointment, along with reminders. The patient can fill out the questionnaires in the application and the healthcare professional can then review them remotely.

Keywords: care pathways, outpatient care, digital healthcare services, user research, care teams, user centricity, telemedicine

Domotic apartments in Trieste

Fabio Bonetta

A.s.p. Itis, Trieste, Italy

Correspondence: fb@itis.it

Abstract

Introduction: In Trieste, the oldest city in Europe, we created three domotic apartments to promote new models of technologically assisted living for elderly people who can still live independently. One of these is a place equipped with several assistive devices where people can train their mental and functional abilities and at the same time learn how to use new devices, sensors and furniture.

Methods: Domotic apartments have been designed according to the needs of future residents. We tested different solutions where expertise and experience in social and health care areas, as well as technological, architectural and plants know-how are all related to each other. The aim of this project is to make rooms and furnishings fully available to all users and to provide an efficient system of remote control of indoor temperature, lighting, control and energy-saving devices. The system is user-friendly and ergonomic and can easily be connected to our services and support disabled people to maintain their independent living. Security: alarm systems based on sensors, video cameras and recording, domestic security sensors for electric problems, water and gas leaks as well as reminder systems of taking medication and medical alert devices.

Results: We worked hard on the design to make the system easily accessible and available to all users. The software and its related apps are based on internet connectivity in order to offer a wide range of different services: home, social and health care services as well as administrative and technical services. Each apartment is designed for a single person or a couple; it is equipped with a living room, a domotic kitchen, a bedroom and a bathroom. Everything has been conceived to assist people in their daily activities thus ensuring their independent living. Interfaces have been created following a new social model based on a careful assessment of the users' needs. The system is user-friendly since it is based on the use of television, which the elderly like to use, together with a tablet. The software gives people many different options: information about events, newspapers, weather forecast or it can remind them of appointments and taking medicines. It can interact with television, media libraries (video and audio collections, audio books), libraries and socials. It can also be used to keep in contact with family members and friends, social and health care operators or to get information about transportation, chemists, markets, shops, web services or Skype. It can also be used for home management: automatic reminder systems can perform everyday activities such as turning on/off the lights, video cameras controls, locking/unlocking doors, giving reminders about taking medicines and remote control. The apartments are all equipped with furniture and fully functional domotic kitchens.

Discussion and conclusions: The obtained results are highly promising. Living in these apartments has changed people's lives. Their self-confidence, self-image and self-care abilities have improved and they were content about making this choice in their lives. We are thinking of designing a specific scoring evaluation related to this project, although the current assessment method, applied by social services, has already pointed to the success of this project and in the past few months we have been working to set up three more domotic apartments in the same building.

Keywords: knowledge, needs analysis, professional skills, teamwork, social innovation, usable technology, respect for people

Health literacy level of patients according to Russian physicians

Natalia Vyatkina

Institute of Ethnology and Anthropology of Russian Academy of Science – post-graduate, Moscow, Russia

Correspondence: natalia.vyatkina@gmail.com

Abstract

Introduction: The WHO considers health literacy (HL) to be one of the most important determinants of health. There are plenty of approaches and methodologies of measuring HL level worldwide and there are several in Russia as well. The Russian government proposed different medical system development programs, each of those paying attention to HL and the importance of disease prevention. The aim of this anthropological research is to determine the current attitude of Russian physicians to an increasing HL level of their patients, which is the result of the Internet and other sources of media.

Methods: Qualitative research based on an on-line questionnaire of 69 physicians from different regions of Russia (almost one half from Moscow) and representing a variety of medical specialties.

Results: HL level of Russian patients is considered to be rather poor although the volume of health-related information is extremely high. An interest in health information has been increasing year on year, but this does not mean that work has become any easier for Russian physicians. Sometimes patients do not know the basics (at home or in hospitals). Due to the fact that the time of a physician's appointment is limited by administrative instructions, almost half of the respondents would prefer their patients to search less about their health on-line. Despite all that, physicians that took part in this research evaluate the HL level of their patients as acceptable for a person without medical education.

Discussion and conclusions: Although the modern world is focused on patient-oriented medicine and shared decision-making in physician - patient communication, a paternalistic approach still remains preferable in Russia. However, 80% of the research participants pointed out that the HL level of Russian patients needs to be improved. Respondents consider following the physician's recommendations and knowing the basic information about their health and the health of their relatives to be most important for effective health-care relationships. The Internet has a great effect on the HL level, although direct physician and patient communication remains most necessary and important. Measuring the HL level of patients is a key current task for sociologists and anthropologists in Russia as is searching for the most efficient instruments of enhancing this level.

Keywords: patient-physician communication, health literacy, medical anthropology, Russia

Child health digital ecosystem

Elizabeth Siderius¹, David Neubauer²

¹GGD IJsselland, Rare Care World, Kampen, Netherlands

²University Medical Centre Ljubljana, Division of Paediatrics - Department of Child, Adolescent & Developmental Neurology, Ljubljana, Slovenia

Correspondence: e.siderius@kpnplanet.nl, david.neubauer@mf.uni-lj.si

Abstract

Introduction: The United Nations Sustainable Development Goals (SDG) “ensure healthy lives and promote well-being for all ages”. To meet the challenge of sustainable health care, communication and cooperation between everyone involved in child health should be supported. Information systems, providing interoperability between public health, medical- and social care, generate data to improve health. To establish a semantic interoperable child health record, efficient management and publishing of terminologies is a precondition.

Methods: The European Academy of Paediatrics has established a working group on ethics and rare disease to ensure the input of pediatricians in the universal right of the disabled child. One global e-health model has been designed to harmonize interoperable child health. A core set of terminologies was identified:

- 1) to identify the child in primary care
 - ICPC International Classification of Primary Care
 - HPO Human Phenotype Ontology
 - LOINC Standard for identifying health measurements, observations, and documents
- 2) to classify the disease
 - ICD International Classification of Diseases
 - ORPHAnet Classification of rare diseases
 - OMIM Catalog of Human Genes and Genetic Disorders
- 3) for follow-up and treatment
 - ATC Anatomical Therapeutic Chemical Classification System
 - SNOMED Clinical health terminology
- 4) for social support
 - ICF International Classification of Functioning, Disability and Health

Three different rare conditions were selected to compare the e-health services.

Results: Duchenne Muscular Dystrophy, neonatal cholangiostasis, and Shwachman Diamond Syndrome, completely different rare and complex disorders can all be affiliated to this set of international classifications. Still harmonization of data exchanges within states and across borders seems to be the major hurdle in digital personalized health.

Discussion and conclusions: The World Health Organization states that a collaborative management approach at the primary health care level involving patients, their families and other health care providers may reduce the burden of disease for the child, family, and society. The family-centered chronic care management originated in pediatric care.

A general global set of interoperable classifications can help to ensure awareness and optimal health for children with a rare and disabling condition. Knowledge of the diseases as well as e-health is a

precondition in designing efficient digital strategies. A holistic semantic structure connects primary care, hospital care and integrated person centered care. These structures are not in place and/or locked in vendor dependent IT systems.

Keywords: e-health, child health, chronic condition, interoperability

Still Active - Enabling autonomy of persons with dementia using IONIS technology

David Krivec ¹, David A. Fabjan ²

¹ Spominčica - Alzheimer Slovenia - Slovenian association for help with dementia, Ljubljana, Slovenia

² R&RUI, Ljubljana, Slovenia

Correspondence: david.krivec@spomincica.si, david.fabjan@gmail.com

Abstract

Introduction: Demographic changes and aging population in Europe have caused an increased demand for age-related services to help maintain individuals' autonomy and prolonged stay in home environments. One of the most prevalent diseases that the population is facing is dementia. Dementia-affected individuals experience an irreversible and progressive decline in memory functions, problems with orientation and confusion. This results in problems affecting a person's ability to live healthily and independently. IONIS, a research project co-financed by AAL - Active and Assisted Living, is geared towards easing these issues for both patients and caregivers. The IONIS system is a solution for health style monitoring, home safety automation, and assisting with a personal agenda using reminders and alerts. Also, caregiver administrative tools (e.g. administrative tools for several users, user dependent sensor settings) were developed.

Methods: For the purpose of assessing the real needs of persons with mild dementia or MCI and their caregivers, we have conducted a multinational study involving four countries, 121 end users and 103 caregivers. The IONIS project is conducting pilot studies in the homes of 10 persons with dementia in every participating country. The pilot studies involve implementation of intelligent assistive technology like smartwatch, smart bracelet, sleep sensor, smart scale, smart blood pressure sensor, and smart gateway for monitoring ambient parameters, activities, health and safety.

Results: More than 60% of the respondents would most likely or are likely to use assistive technologies to improve their life as a patient or a caregiver. The other 40% were undecided. The main desired functionalities are fall detection, health, and sleep monitoring, and a personalized calendar with reminders and assistance in finding objects. The first phase of pilot studies was successfully concluded in all four countries. End users and caregivers tested and assessed individual devices. The gathered data is used for the development of procedures like wandering detection, sleep quality assessment, which will all be used to add new rule engines for the integrated smart platform. Development and implementation of the new assistive technologies can significantly contribute to maintaining the autonomy of users. They can increase safety and security in performing everyday activities in and outside the persons' home.

Discussion and conclusions: The system, intended for helping to maintain the healthy lifestyle of the affected person, must be general enough to easily and unobtrusively manage most unvented and potentially dangerous situations such as safe electricity and water management together with appropriate alerts for caregivers. Since dementia affects each person differently and people also have quite a different socio and economic background, a part of the solution must be flexible enough to alert on the persons' specific problems (e.g. wandering and getting lost, not drinking enough water). One of the ongoing research problems when building such a solution is thus how to unobtrusively and with the fewest sensors possible, predict most of the unwanted scenarios and offer it to the market as a cost-effective and reliable solution.

Keywords: dementia, assistive solution, healthy lifestyle and autonomous living, safe home, caregivers, caretakers, AAL

Is there a need for CAM education in health care professionals training programs in the digital era?

Aleksandar Racz, Ivana Crnković, Ivan Brumini

University of Applied Health Sciences - Dept. of Public Health and Health Care, Zagreb, Croatia

Correspondence: aleksandar.racz@zvu.hr, ivana.crnkovic@zvu.hr, ivan.brumini@zvu.hr

Abstract

Introduction: In spite of the exponentially increasing interest and use of Complementary and Alternative Medicine (CAM) among patients over the previous decades in Croatia, there are still no data about the attitudes and beliefs of health care professionals in Croatia about the possibility and necessity to incorporate CAM into traditional medical education. Patients are trapped into ideological and professional disputes between the majority of allopathic establishment and CAM advocates and promoters or/and CAM practitioners and forced to seek help in both systems surrounded with health care professionals without sufficient knowledge to advise them which way to go.

Methods: The study was conducted on a sample of 569 participants (173 nurses, 312 physiotherapists and 84 sanitary engineers) by using a random sample method from the total number of enrolled students at the University of Applied Health Sciences in Zagreb in the academic year 2017/2018. The sample represented one fifth of the total number of students enrolled in the observed period. Among 569 participants there were 138 male and 431 females. The average age was 23.7 +/- 6.51 years.

Results: Sample analysis has shown that 58.52% of the participants themselves, or some of their family members, have used one of the methods at least once in their lifetime; 65.38% of the participants confirmed that they met at least one patient who used one of the CAM methods; 66.96% of the participants confirmed that if they were seriously ill they would be ready to seek help from a CAM therapist; 72.04% of the participants confirmed that they would be interested in CAM if such training was organized. Only 22.8% of the participants confirmed that during their previous training in the field of health care through verified curricula they were informed about various CAM topics. 59.7% of the participants agreed about the academic allopathic society not having any knowledge about CAM and CAM not being included in the training programs for health care professionals. At the same time, 39.7% of participants expressed their need to obtain formal education in CAM. 61.7% of all participants would like to acquire sufficient knowledge through formal education programs so that the interested patient could be properly informed about the possibilities of application and effectiveness of CAM. The majority of participants (56.9%) have expressed positive attitudes about incorporating CAM into the curricula through supporting the statement that CAM should be integrated into various classical health care facilities (from anatomy to internal medicine and health care) to all the levels of education, both theoretically and practically.

Discussion and conclusions: The truth is that in the official nursing curriculum there is not a single word about the CAM philosophical background, practical use or research data. Health care professionals perceived that they had very little knowledge of complementary and alternative medicine, but they seek organized education within regular university curricula and the advocate for the integration of CAM education into the training programs for health care professionals in Croatia. Setting educational standards and developing consistent curricula for CAM will help students emerge from academic programs prepared for safe and effective practice and with skills to evaluate the effectiveness and participate in the research on CAM therapies.

Keywords: complementary and alternative medicine, health care professionals, attitudes, integration, training programs

The role of e-health literacy in patient empowerment in online health community

Sara Atanasova, Tanja Kamin, Gregor Petrič

University of Ljubljana, Faculty of Social Sciences - Centre for Methodology and Informatics, Ljubljana, Slovenia

Correspondence: sara.atanasova@fdv.uni-lj.si, tanja.kamin@fdv.uni-lj.si, gregor.petric@fdv.uni-lj.si

Abstract

Introduction: With the vast amount of online health-related sources and information and the increasing complexity of the health system, greater expectation is put on patients to become responsible for their self-care and to possess enough health-related knowledge and skills to guide them through complex health-related situations. Skills for a critical evaluation and validation of online health-related information, i.e. e-health literacy, have become an absolute necessity, since misinformation or wrongly interpreted and used otherwise accurate information can lead patients to make inappropriate decisions, which might result in negative health outcomes and patient disempowerment. Online health communities (OHCs) can be seen as important sources for both valid health-related information, as well as inaccurate and unreliable information. OHCs have often been emphasized in studies as emerging sources of health-related information, but the relation between users' e-health literacy and patient empowerment in OHCs has so far scarcely been studied. The aim of this study is to investigate the relation between various e-health literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validation of information, and being smart on the Net) and patient empowerment in OHCs.

Methods: This study is based on data collected with a Web-based survey on a simple random sample of registered users of the largest OHC in Slovenia, Med.Over.Net. Data was analysed with hierarchical OLS multiple regression analysis.

Results: The results demonstrate that recognizing the quality and importance of health-related information and understanding online health information have, among OHC users' e-health literacy dimensions, a significant effect on patients' self-efficacy. Similarly, perceived health competence is statistically significantly associated with users' developed skills for recognizing quality and meaning, understanding information and perceived efficiency of performing a search process of online health-related information. The results also show that OHC users' understanding of health information, validating it and using the Web in a smart manner as well as recognizing biases of Internet-based health information significantly affect their control over health-related issues. The development of OHC users' motivation control, i.e. the desire for control or even self-determination to achieve disease-related goals and manage health-related issues, is significantly affected by the users' understanding of online health-related information and perceived efficiency of performing a search process of online health-related information. Interestingly, the e-health literacy dimension awareness of health information sources does not have a significant effect on any patient empowerment dimensions.

Discussion and conclusions: The study demonstrates that the users' ability to attain health-related information, evaluate its reliability and understand and interpret such information can greatly influence their motivation, competence, control and self-efficacy, which have a key impact on an individual's self-care, management of disease, and good health outcomes.

Keywords: E-health literacy, patient empowerment, online health community

Are students of health sciences sufficiently information literate?

Špela Plesec, Marija Milavec Kapun

University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

Correspondence: spela.plesec@zf.uni-lj.si, marija.milavec@zf.uni-lj.si

Abstract

Introduction: As ubiquitous as digital technologies are in the everyday life of young people this does not necessarily mean that young people are sufficiently information literate. Information literacy has come to represent an important set of skills and knowledge which is essential for students at all levels of academic education regardless of the professional field. These competences encompass the ability to conduct thorough research and then use that research effectively and ethically to produce high quality professional and scientific papers, presentations and other writing. The purpose of the paper is to assess the level of information literacy of health science students in Slovenia.

Methods: In order to evaluate students' information literacy, a validated measuring instrument - The Slovenian Information Literacy Test was used. The test was completed by students on the online survey in the period from May to mid-July 2019. A random sample was designed according to the principle of snowball: the link to the online survey was sent to students through their representatives with a request for publication on various social networks and to forward it to other students. A Quick Response code for an online survey was created and printed on a flyer with an invitation to participate and then distributed to students. The obtained data were presented with descriptive statistics.

Results: Of 112 students included, 79 students completed the whole test. Of these, half were nursing students ($n = 40, 50.63\%$), 12 (15.19 %) were midwifery students, 6 (7.59 %) physiotherapy students, 3 (3.79 %) medical students and some were students of other health sciences. 57 (72.15 %) were female and 12 (15.19 %) were male students. On average, students achieved 67.75 %, while 22 students achieved less than 60 %. Master and doctoral students achieved 34.63 points (86.59 %). The most difficult were questions no. 28 (15 %), 36 (20.25 %) and 12 (27.85 %). Students were the most successful at questions no. 7 (96.20%), 25 and 10 (both 93.67%). According to the Bloom cognitive level, they were most successful in questions relating to the first cognitive level - remembering (74.98 %), a little less 68.28 % for second-level questions - understanding, and the least 58.45 % for third-level questions - use of knowledge and higher cognitive levels. According to the Association of College and Research Libraries criteria and indicators of information literacy, only 55.70% of students reached the 5th level, which reflects an understanding of the economic, legal and social aspects of acquiring and using information in accordance with ethical rules and legal regulations.

Discussion and conclusions: The average overall score achieved in the test is comparable with the score achieved in the validation. The results indicate that information literacy improves during studies. It would be suitable to study the phenomena more systematically and to include a larger number of students in order to generalize the results. The research should be repeated in written form or in a controlled environment where students would answer questions based on actual knowledge. In order to monitor the acquisition and development of competences in information literacy during the studies, different measurement instruments should be used and, in accordance with the results obtained and proposals for its improvement should be formulated.

Keywords: STIP, information literacy, health care, study

Building a model of digital health competencies for nursing students

Tina Gogova ¹, Marija Milavec Kapun ¹, Andreja Kvas ¹, Raija Kokko ²

¹ University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

² Tampere University of Applied Sciences, Tampere, Finland

Correspondence: tina.gogova@zf.uni-lj.si, marija.milavec@zf.uni-lj.si, andreja.kvas@zf.uni-lj.si, raija.kokko@tuni.fi

Abstract

Introduction: Modern approaches to managing patients with chronic diseases indicate the need for the use of digital technologies that enable empowered patients to provide quality health care treatment at home. Considering the developmental and demographic trends, the role of integrated patient telecare is expected to increase. In addition, nurses will also have important roles in virtual interdisciplinary teams, which will need additional specific competencies. Traditional formal education of nurses does not include the development of the digital (health) competencies of nursing students, which are crucial for the patient-centered eHealth care, which has an intensive emphasis on patient support in self-management. The purpose of this paper is to identify the key elements of the model for teaching nursing students how to support patients with chronic diseases in self-management through digital technology.

Methods: With the Erasmus project, DigiNurse - Learning ICT Supported Nursing for Self-Management of Patients, which includes information technology and nursing experts from educational institutions from Finland, Belgium, Portugal and Slovenia, we are developing the DigiNurse model. The model will support the modernization of the education content of nursing students and support the acquisition of the necessary skills and competences for the digital support of patients with chronic diseases in self-management. Several literature reviews of individual fields of education, the use of information communication technology and digital and preventive approaches in nursing care, including the field of empowerment and support in self-management of patients with chronic diseases were conducted. An overview of the literature on pedagogical models and approaches in the education of nursing students was also made.

Results: The literature review did not detect the presence of a conceptual model for teaching digital competencies in the field of nursing care. Three key foundations of the model were identified: health coaching, pedagogical approaches and models of education in the use of computer technology. The pedagogical models and approaches used are different, the dominance of traditional ways of teaching nursing students is gradually being replaced by various modern and active forms of teaching. The use of various online educational platforms is growing.

Discussion and conclusion: The concept of digital (health) competences is relatively new and is dynamically upgraded with the development of digital health technologies. As the number of patients with chronic diseases increases, self-management, which is more effective with professional support and using available digital technology, is highly significant. To implement support of self-management, nurses should adopt an appropriate level of competencies. The new educational model will include content elements, didactic approaches and the organization of education, which will support the development of digital health competences of nursing students. By designing the DigiNurse model, a contribution will be made to theoretical bases, with an aim to increase digital health competences of nursing students. This will contribute to a more effective and efficient treatment of patients with chronic diseases, especially at home. The quality of health care and better outcomes for patients with chronic diseases is significantly influenced by integrated and continuous

support in achieving optimal health and well-being. Nurses play a key role in this. Therefore, it is important to keep up with the development of the profession and modern technologies and, accordingly formal nursing education, which will enable us to acquire competences in the use of digital solutions to support the health and well-being of patients and to successfully transfer this knowledge to patients and their relatives.

Keywords: nurses, nursing students, digital competences, DigiNurse model

Achieving goals of digital competences in nursing education on the secondary school level, project POKIT

Vesna Šušnica Ilc, Lucija Matič, Sabina Egart

The Secondary School of Nursing Ljubljana, Ljubljana, Slovenia

Correspondence: vesna.susnica@guest.arnes.si, lucijam@yahoo.com, sabina.egart@guest.arnes.si

Abstract

Introduction: The paper presents a case of cross-curricular teaching at a secondary vocational school, where teachers of general and professional modules cooperate and teach students with ICT to improve their digital competences.

Discussion and conclusions: A group of teachers from the Secondary School of Nursing in Ljubljana joined a project called POKIT, which is supported by the National Education Institute Slovenia and the Institute of the Republic of Slovenia for Vocational Education and Training. The goal of the project is to promote digitalisation of the learning process and digital literacy amongst students in secondary vocational schools. The team of teachers from the Secondary School of Nursing in Ljubljana defined common topics after reviewing their curricula. The shared topics were then presented to the students in a cross-curricular manner, vertically and horizontally. The learning module of taking the vital signs, which is a topic in the 2nd study year, was summarised in a form of a shared Google document that was created by students and teachers together. The learning content in that document is written in the Slovenian and English language. The taking of the vital signs was performed on students, where mostly normal vital signs were recorded. For that reason, the students were introduced to the possibility of measuring pathological vital signs on a vital sign simulator BT CEAB2. The students learned how to use the simulator independently and how to guide the simulator settings. Along with the professional content in the document, students also made video recordings of taking vital signs in Slovenian and two foreign languages (English and Bosnian). The vertical cross-curricular cooperation was performed by including students from the 3rd grade, who upgraded their fundamental learning content from the 3rd grade curriculum. With their teacher they took vital signs on a child and they supplemented the document with the learning content that would be a learning content for the 2nd grade students in the following year. All of the digital materials are available for students and teachers of both grades. In evaluations, which were performed with structured forms and guided interviews with the students and teachers, the authors found that the cooperation is both, a joy and a challenge for the teachers as there is also a certain level of stress present because of poor digital knowledge skills. The authors found that students could be demotivated when overusing digital tools and that the accomplished tasks could also present an additional work load for the students. The major source of discomfort for the students were video recordings and the feelings of dissatisfaction because of the mistakes they made when performing interventions either from a professional or linguistic aspect. With these findings, there are possibilities for further formative assessment with the students, where making a mistake in a learning process is permitted and even expected and where that process leads to the final goal of obtaining a qualification for a safe and high-quality nursing care in a clinical environment and in their future profession.

Keywords: digital competences, nursing education, project POKIT

Digital health literacy of nursing students

Karin Zajc, Marija Milavec Kapun, Tina Gogova

University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

Correspondence: zajc.karin@gmail.com, marija.milavec@zf.uni-lj.si, tina.gogova@zf.uni-lj.si

Abstract

Introduction: Health literacy is a concept, which is increasingly more present in our environment, although not yet known to everyone. eHealth literacy is an individual's ability to search for health-related information, the understanding, critical evaluation of relevance and quality of gathered information, the ability to put it to use in achieving the optimal level of health and well-being as well as overcoming the challenges regarding one's health. A low level of health literacy leads to higher morbidity, more frequent hospitalisations and a higher rate of mortality. This is why it is important to improve the level of health literacy in patients and their digital skills necessary for using information technology. The World Wide Web is widely used for searching health care information although less is known regarding the skill of an individual in searching for and evaluating the relevance of retrieved information relating to health. Several validated instruments for measuring eHealth literacy exist, however they differ in their function, form and approach. Digital health literacy, which includes eHealth literacy, can affect both the key competences of students, as well as their future workplace success. The purpose of this publication is to assess the eHealth literacy of nursing students in the chosen educational institution.

Methods: The quantitative approach was used. The eHealth Literacy Scale is a frequently used measuring instrument for the assessment of e-health literacy. A convenience sample was used. The research involved 186 nursing students of the 2nd ($n = 70$; 37.63 %) and 3rd ($n = 116$; 62.37 %) year at the Faculty of Health Sciences in Ljubljana. 27 were men (14; 52 %) and 159 were women (85.48 %). They were predominately full-time students ($n = 129$, 69.35 %), with fewer part-time students ($n = 55$; 29.57 %), others ($n = 2$; 1.08 %) studying with a different kind of the status. The survey took place from November 2018 to March 2019. The students completed a hard copy questionnaire.

Results: The nursing students find the world wide web useful for making decisions regarding their own health ($M \pm SD = 3.3 \pm 0.9$), and also useful for accessing digital health care sources and content ($M \pm SD = 3.9 \pm 1.0$). In the self-evaluation of their health literacy, the students scored an average of 29.62 points on the scale of 8 to 40 (the highest number of points and the best eHealth literacy). 35 students (18.82 %) scored less than 26 points in the self-evaluation of their eHealth literacy and 14 students (7.53 %) scored 26 points.

Discussion and conclusions: With the survey we have found that on average eHealth literacy among students of the chosen educational institution is good. However, eHealth literacy is poor in more than a quarter of nursing students. It would therefore be beneficial to include eHealth and even digital health competencies in the educational process of future nurses. With the appropriate nurses' digital health competencies successful digital support for patients, which is of key importance for the use of digital technologies in support of patients' health, would be assured. Further research of this phenomenon among nursing students and other health care employees would be on point, as well as the utilisation of other, more specific instruments.

Keywords: eHealth literacy, students, health care, eHealth Literacy Scale.

Quality of online first aid tips

Eva Dolenc, Jelena Ficzeko, Argresa Bylykbashi, Damjan Slabe

University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

Correspondence: eva.dolenc@zf.uni-lj.si, jelena.ficzko@zf.uni-lj.si, argresa@gmail.com,
damjan.slabe@zf.uni-lj.si

Abstract

Introduction: Many individuals search for information about illnesses and health (including first aid measures) online. The web is nowadays an indispensable source of information available to nearly everybody. Easy access, and creation and modification of information have brought new issues. It is important to highlight the quality of available online information from different sources. The question is which sources are reliable enough to provide health information, and what is the quality of published information. The aim of our research was to ascertain the quality of websites that provide information on first aid, and the quality of obtained information. We checked the quality of information on selected first aid measures on Slovenian websites.

Methods: We evaluated the quality of information on the following first aid topics: use of Automatic External Defibrillator (AED), partial respiratory arrest by a foreign body, seizure, snake bite and the contents of first aid kit. In recent years, guidelines for the selected first aid areas have changed, so one of the selected criteria was also up-to-date, verified information on the web. The other criteria were the consistency of information with the profession, accuracy of information, authorship and relevance of the references, as well as website functionality. We determined the content quality of the information by answering the question. Data collection was carried out by using an evaluation form. Among the 111 web pages on selected first aid topics found with suitable keywords, we chose and evaluated 37 of them. The students of the Faculty of Health Sciences in Ljubljana participated in data collection. The data were processed using Microsoft Excel 2016.

Results: To find first aid information, most students used the Google Chrome browser and Google Scholar. The majority ($n = 35/37$) of the websites have open access and work well ($n = 36/37$). Only 10 of them were updated after 2016. Many websites also have ad content ($n = 16/37$). The average search time for information about the selected first aid measures was 11 minutes (minimum 6 minutes and maximum 15 minutes). The quickest information that students obtained was on first aid kit, while it took the longest to find information on first aid measures after a snakebite. In all the selected topics, we obtained answers, however, in nine cases, they did not meet the standards of the profession. The information about the use of AED and snakebite is obsolete, and therefore incompatible with the current guidelines regarding first aid. In most cases ($n = 22/37$), the author is unknown, and there are no references to support the information ($n = 21/37$).

Discussion and conclusions: On Slovenian web pages, it is not difficult to find information on first aid measures. It is necessary to pay more attention to information updates. First aid guidelines are developed according to findings and the same should also apply to health information.

Keywords: first aid websites, online health information, quality of information

The concept of information system prototype for the implementation of the clinical pathway in perinatal healthcare

Uroš Višič¹, Boštjan Žvanut²

¹ University Medical Centre Ljubljana, Ljubljana, Slovenia

² University of Primorska, Faculty of Health Sciences, Izola, Slovenia

Correspondence: uros.visic@kclj.si, bostjan.zvanut@fvz.upr.si

Abstract

Introduction: The clinical pathway is defined as a modern methodology which represents a schematic treatment in a clinical environment in various treatments and on various levels of health care. It is possible to strengthen the cooperation with other members of the health team, who are timely informed of the interventions that have been conducted previously. Also, the mother of a newborn who is actively involved in postnatal treatment is an added value to the quality of treatment during hospitalization.

Methods: A systematic review of literature and structured interviews of employees in a clinical environment identified the existing clinical pathway. With the modelling method we created a prototype of the information system, which we also evaluated. Through a systematic review of professional and scientific publications, articles and websites in the field of nursing, informatics, management and quality, we reviewed the existing documentation. The literature search was carried out using the COBISS system and specialized databases such as Cochrane, Cinahl, Scencedirect and Pubmed. Identification of the existing clinical pathway was carried out by reviewing the documentation provided by the interviewees. The prototype of the clinical pathway and its usefulness in a clinical setting were presented. We followed the proposals of interviewees to improve the information system prototype. The e-clinical pathway was drawn using the elements of the ARIS notation (Architecture of Integrated Information Systems) and was focused on the process flow diagram. A modelling method for the development of the desired information system was also used to develop the prototype. Evaluation of the developed prototype was carried out by analysing the opinions of the interviewees working in the clinical department. They also made suggestions for its improvement and upgrade.

Results: We determined the optimization of the information system prototype. For each domain the individual forms must be adapted to treatment. The results of the prototype evaluation have shown that it can adequately support the clinical pathway. Evaluation suggestions made by evaluators were subsequently included in the evolving prototype. Treatment may take place regardless of a patient's gender and age. As such, it is useful in all areas of nursing as a discipline.

Discussion and conclusion: The introduction of treatments in the clinical pathway system, which is supported by the proposed information system, can significantly improve and facilitate the way of documenting the performing treatments in the clinical pathway. The presented prototype of the information system enables nurses to easily record the performed nursing interventions and activities, and to check derived interventions at any time. Also, the prototype leads to the capture of all stages in the clinical pathway. Nurses could upgrade their professional competences, recognize possible deviations, and take over some of the tasks of the other members in the current way of treatment at the tertiary level. By reducing unnecessary duplication of performed interventions, first on paper and then electronically, nurses would gain more time, which could be used more efficiently.

Keywords: clinical pathway, nursing, documentation, newborn mother, health education.

Patient-oriented mobile phone apps for type 2 diabetes risk estimation: a systematic review of Finnish diabetes risk model

Lucija Gosak, Leona Cilar, Nino Fijačko, Gregor Štiglic, Majda Pajnkihar

University of Maribor, Faculty of Health Sciences, Maribor, Slovenia

Correspondence: lucija.gosak@student.um.si, leona.cilar1@um.si, nino.fijacko@um.si, gregor.stiglic@um.si, majda.pajnkihar@um.si

Abstract

Introduction: The frequency of type 2 diabetes around the world is on the increase and represents a major public health problem for both, the individual and the society as a whole. To reduce its frequency, it is necessary to determine the risk factors for the development of the disease as that is the only way to slow down its progress or even completely prevent its occurrence. The use of information communication technologies, which also include mobile applications, enables service users to assess the risk of developing type 2 diabetes. Mobile applications can provide users access to a wide range of information. In the survey, we wished to show how many mobile applications contain the FINDRISC predictive model, which enables the individual to estimate the risk of the T2D and is also used in the official guidelines in the Slovenian family medicine model practices.

Methods: With the use of the "FINDRISC" keyword a systematic overview of mobile applications in the Google Play Store online was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis - PRISMA recommendations. The final number of content-relevant mobile applications was acquired by following inclusion and exclusion criteria. In the final analysis we included free mobile applications and those in English for the assessment of the risk for the development of type 2 diabetes, which used the FINDRISC model for predictions.

Results: We identified 250 mobile applications in the online Google Play Store using keywords. Based on the described methodological approach, three mobile applications ($n = 3$; 1%) were included in the final analysis. All mobile applications provide information on the methods used, while two mobile applications ($n = 2$; 67 %) are based on scientific research work. Moreover, 67% ($n = 2$) of the mobile applications inform the user that prediction is intended for general use only. One mobile application (33%) also included health education and provided advice on how to reduce the risk and improve the user's lifestyle.

Discussion and conclusions: Based on the obtained data, we have found that a small percentage of mobile phone applications included the FINDRISC model for accessing the development of type 2 diabetes. Most mobile applications provide relevant information based on evidence. Due to rapid progress, new mobile applications are being developed daily to anticipate the risks, so research in this direction needs to be upgraded to offer users appropriate mobile applications.

Keywords: m-health; predictive models; diabetes; mobile apps, Google Play Store

Evaluation of user experience with neuromodulation device Sooma tDCS

Nika Pušenjak Dornik ¹, Mika Nikander ² Sara Cossutta ³

¹ Research group Larus Inventa, Cerklje, Slovenia

² Sooma Oy, Helsinki, Finland

³ Savogna d'Isonzo, Friuli-Venezia-Giulia, Italy

Correspondence: nika.pusenjak@larusinventa.com, mika@soomamedical.com, saracossutta@gmail.com

Abstract

Introduction: Sooma tDCS™ device is a portable stimulation unit. Cloud-based Sooma Online platform enables a health care professional to stay in control of the therapy even when it is applied in a patients' home. The device stimulates the brain relevant neuronal pathways using small electrical current in order to achieve treatment response. Sooma tDCS device is used among other applications for Sooma Pain Therapy and offers an effective pain relief and helps to reduce analgesic use and is used also for Sooma Depression Therapy.

Methods: Our goal was to test the mobile Sooma application in the English language and establish how its users evaluate it. We tested 20 first-time users with UEQ, (User Experience Questionnaire), of whom 10 were Slovenian men and 10 were Slovenian women, between 25 – 50 years of age who are moderate app users and they speak English well.

Results: Among other results the study results suggest that in this age range the users find the app interesting and modern.

Discussion and conclusions: The results could also point out the necessity to translate health apps to a native language to better evaluate the state of the patients during home therapies.

Keywords: mobile app, UEQ, tDCS, depression, pain therapy

Effects of assistive technology on participation of persons with learning disabilities in health systems

Silva Bajde, Andreja Škorjanc Marinč

Draga Training, Occupation and Care Center (CUDV), Draga, Slovenia

Correspondence: silvabajde8@gmail.com

Abstract

Introduction: Persons with mental disabilities (MD) use the health system more frequently than other people. They may have problems with motor impairment, sensitivity, perception, cognition, communication, social interaction and frequent acute and chronic illnesses, so they need different level of supports and help in everyday life. Meanwhile, digital revolution is rapidly changing the way people live, learn, work and socialise. Technologies are important for persons with special needs. Informational and communication technology (ICT) and assistive technologies help a person with special educational needs to a higher quality of life, social inclusion and have an effect on higher levels of participation (National Health Organization (NHO), 2009). Hersh in Johnsen (2015) have defined assistive technologies (AT) as any device, piece of equipment or system that helps to bypass, work around or compensate for an individual's specific learning deficits. AT help persons with learning disabilities, their families, carers and medical professionals in health systems.

Methods: The authors present case studies of how persons with learning disabilities can tell what problems they have, how can cooperate in medical systems in how they become actively in healthy process. The authors present the role that assistive technologies play for parents, carers and medical professionals.

Results: Case studies have shown that assistive technologies enable persons with learning disabilities to be active and more cooperative in our medical health system. A person can get information by using the internet. Experience from the ACCESS pilot trainings about using the internet safely and in a fun manner has shown how an ICT may help to do more and in a better way.

Discussion and conclusions: ICT and AT enable persons with learning disabilities to a higher participation in health systems. They made progress with assistive technologies in caring for their own health during the process of health and rehabilitation. The social environment, alongside the effective utilisation of ICT and AT, help patients with MD learn how to lead a healthier lifestyle.

Keywords: person with learning disabilities, ICT, AT, health system, ACCESS project

SIZiF – Exams IT system at the Faculty of Health Sciences

Miha Fošnarič¹, Samo Penič², Tomáš Mareš³

¹ University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

² University of Ljubljana, Faculty of Electrical Engineering, Ljubljana, Slovenia

³ Czech Technical University in Prague, Faculty of Mechanical Engineering, Department of Mechanics, Biomechanics and Mechatronics, Czech Republic

Correspondence: miha.fosnari@zf.uni-lj.si, samo.penic@fe.uni-lj.si, tomas.mares@fs.cvut.cz

Abstract

Introduction: SIZiF is a system for generation, optical recognition and automatic assessment of written exams used at the Faculty of Health Sciences, University of Ljubljana. SIZiF is developed and maintained on the basis of our own knowledge and experience. All the software is open source, which means that it is freely accessible for use, development and further implementation. We present the whole process from the generation of questions to the assessment and publication of students' results, as well as our practical experience with SIZiF at the faculty.

Methods: SIZiF source code is written in Python. The user interacts with SIZiF through a web interface using HTTPS. The web page is built in the Django web framework. The SIZiF server is located at the faculty and uses the Ubuntu operating system and the Apache web server. SIZiF has its own markup language to define the problems, and creates a PDF file of problem sheets using the LaTeX compiler. OCR uses libraries OpenCV, pyzbar in scikit-learn. Data is stored in PostgreSQL database.

Results: SIZiF generates a unique problem sheet of multiple-choice questions for each student. Even if the same set of questions is used for all students, it shuffles the order of questions and possible answers for each exam. Problem sheets are printed and distributed among students. After the examination, filled sheets are scanned and their images are sent to the server. The SIZiF server evaluates the answers and links them with students. If allowed, the students can see their assessed exams online and submit potential complaints. The protection of personal data is taken care off. The implementation of SIZiF did not demand additional investments from the faculty. Hardware requirements for the server and scanner are low and an already existing infrastructure was used. In 2018 and 2019, SIZiF was successfully applied to exams for six faculty courses, more than 20 examinations and thereby more than 1000 students' problem sheets were generated and processed.

Discussion and conclusions: After some initial difficulties, SIZiF has been successfully implemented. Students' response is positive and they prefer objectivity and fast feedback. The faculty staff welcomes lower levels of cheating and the time saved with automatic assessment of the exams. What remains open is a broader systematic implementation. There are still steps in the SIZiF process that require expert knowledge, especially for the generation of problem sheets, and optical recognition and automatic assessment control. For a broader and more routine use, the interface for generation of exams and assessment control should be more user friendly. There should also be a systematic technical support – as with every IT process, something can always go wrong. Printing and optical recognition, which are the key reasons why SIZiF was developed in the first place are the most prone to errors. To bypass those, each student should be provided with an IT input unit to send their answers to the system (i.e. smartphones, tablets, use of computer classrooms at the faculty or especially designed hardware with the supporting software)

Keywords: written exams, optical recognition, open source, automatic assessment, automatic generation

The use of simulations in healthcare education

Brigita Marc, Karmen Brence, Andreja Kvas

University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

Correspondence: brigita.marc@gmail.com, karmen.brence@gmail.com, andreja.kvas@zf.uni-lj.si

Abstract

Introduction: Health care education is a specific field of education and has been faced with new challenges. As future health professionals students are expected to acquire the necessary theoretical knowledge and practical skills during their studies as well as develop a critical approach to various situations. Educational institutions have been facing an increasing number of students, but a reduced number of suitable clinical environments in which students can perform clinical training. In addition, some patients do not wish students to learn practising on them, which is also not ethical in some cases. Due to this problem, new teaching methods have been introduced in the educational process. Nowadays, simulations are coming to the forefront as an effective learning and teaching method. The purpose of this paper is to present simulations as one of the active teaching and learning methods.

Methods: We made a critical review of professional and scientific Slovene and English literature, published between 2007 and 2019. The used databases were CINAHL with full text, Medline, PubMed and ScienceDirect. We used the following keywords: simulations, education and health care.

Results: Simulations represent an innovative approach to learning and teaching and are increasingly used in health care education due to increasing demands for quality training and patient safety. They are based on situations and events from real life and enable training in a safe and controlled environment. There are several different types of simulations: part-task trainers, simulated patients, screen-based simulators, virtual reality and patient simulators. They represent a multidimensional concept in which three main elements influence the level of reality of the clinical situation: simulator, learning environment and teacher. The quality of the simulations and their effectiveness depend on an appropriate simulator, appropriate learning environment which should be comparable to the clinical environment, as well as the teacher, who should be educated and trained in simulations. The key to a successful simulation is debriefing, which should follow the simulation.

Discussion and conclusions: Simulations are a highly effective learning method because they are valuable learning experiences and enable the acquisition of appropriate knowledge and skills, stimulate critical thinking, improve competency and self-confidence and facilitate the use of acquired theoretical knowledge in practice. They also encourage better awareness of the complexity of emergencies and facilitate the retrieval of essential information when needed. They enable a systematic approach, adaptation of the learning process to the individual and their knowledge, and repetition until the required level of knowledge is reached. Simulations improve the ability of collaboration with other health professionals, enable communication skills and successful coping with complex clinical situations. Consequently, the transition from studying to having a professional career is easier for students.

Keywords: simulations, education, health care

The use of information communication technology in the education of students

Žiga Tomšič, Aljaž Bajc, Andreja Kvas

University of Ljubljana, Faculty of Health Sciences, Ljubljana, Slovenia

Correspondence: zigatomsic88@gmail.com, aljz.bajc123@gmail.com, andreja.kvas@zf.uni-lj.si

Abstract

Introduction: Information and communication technology is an indispensable part of modern lifestyle. The rapid development in all areas has greatly increased the need for knowledge and use of computer technology in education. Modern technology is increasingly complementing traditional education through interactive exercises and the use of information and communication technology in knowledge transfer. A teacher can thus make teaching more interesting, while simultaneously promote collaborative learning. That is why, in recent years, one of the main priorities of educational institutions is the use of modern technology in education. The purpose of this paper is to define the use of information and communication technology in the education of students and to study individual methods of ICT. We will also attempt to establish what the most popular and efficient methods of online education are.

Methods: A descriptive method of work was used with a review of professional and scientific literature in domestic and foreign language. The inclusion criteria were literature in the Slovene or English language, the period of publication from 2000 to 2019. The search for the relevant reference literature was also used in the bibliography of the documented sources found.

Results: In education, using information and communication technology as the tool used depends on the didactic needs. The tool should be easy to use, cheap (or free) and should provide all the necessary functions. By analysing the scientific literature, the results were summarized in the four most commonly mentioned methods of using information and communication technology in learning, namely the Skype platform for the purpose of mentoring and distance communication; the WhatsApp application that enables the exchange of messages and multimedia files between two or more participants; the online Moodle platform, or the online classroom used by universities around the world for online learning and collaboration forms of information and communication technology, including Google Drive, OneDrive, and others. Regardless of the communication platform used, the key factors in learning are students' personal characteristics.

Discussion and conclusions: Schools and universities around the world use information technology for learning needs. Information and communication technology has its strengths and weaknesses, but has overall proven to be a good learning tool for students. It influences better cooperation between students and teachers who strive to create an interesting and active environment that offers students the support of using the platform. The weakness was found in the lack of resources, time, knowledge on how to use a particular platform, the lack of technical support and resistance to change. Despite some problems, information and communication technology has proven to be a good tool for student learning and, in particular, the participation of students and teachers whose goal is to create an interesting and active learning environment and to support students in the use of the platform. It is impossible to imagine modern education without information communication technology, but we must realize that every individual is unique and thus has their own way of learning.

Keywords: web, learning, applications, technology

DIH.HealthDay.si, a hub for digital innovation in healthcare

Companies in digital health are different, hence they need a different support system

Eva Turk¹, Mojca Cvirn², Gregor Cuzak³

¹ University South-Eastern Norway, Kongsberg, Norway

² Technology Park Ljubljana, Ljubljana, Slovenia

³ European Connected Health Alliance, Catalyst Inc., Belfast, United Kingdom

Correspondence: Eva.Turk@usn.no, Mojca.cvirn@tp-lj.si, gregor@echalliance.com

Abstract

Introduction: The HealthDay.si community was established in 2014 with the main goal to help each other in entering international markets and embracing the change of health care markets through cooperation and introduction of digital solutions. Since then, the HealthDay.si initiative has grown beyond 100 organizations (startups, scaleup companies, SMEs, public institutions, societies, researchers, academia, students) that regularly respond to the initiatives of Healthday.si. The initiative is moving on from organizing annual conferences and events into developing the Digital Health Innovation Hub (DIH).

In 2018, DIH.HealthDay.si first created a Health Insurance Innovation Initiative to health insurance companies, which met with a very positive response from both, insurance companies and start-ups in Slovenia. This simple initiative then evolved in a fully functioning permanent support programme of the DIH. The goal of DIH.HealthDay.si is to accelerate the transfer of innovation into the Slovenian health system.

Methods: In 2019, together with the network of partners, we prepared a program to support innovative companies from the idea to the patient. To support startup and scaleup companies, DIH.HealthDay.si formed a Think Tank, provided mentors, and organized a special program to speed up the start of the respective innovation. The program consists of three sets, and it continues to support the companies in the core:

1. Innovative companies support program,
2. Opening a dialogue with professional institutions and public institutions to implement changes in the regulatory field,
3. Building the community through the Healthday.si communication platform;

Results: First, we chose five innovative companies that have already entered technology registration procedures with their innovation on different levels in the health care system, either by having started a clinical trial or are expecting the Health Council decision. By becoming a representative of all innovators in the field of digital health, with a professional support program, tailored plans for each selected innovator, with mentors, and a dialogue with different stakeholders, DIH.HealthDay.si wants to contribute to the progress of Slovenian health care.

Discussion and conclusions: The programme's creation came from the realization that innovators are not successful in the health care market unless they achieve some kind of certification and acceptance by the relevant stakeholders. In contrast to most other markets, in health care it is not the end buyer demand that shapes the market, but the situation is much more complicated. HealthDay.si started as a startup platform, but sensing this problem of the key market shaping forces, we soon started transforming it into an ecosystem. In this, we followed the approach of the European Connected Health Alliance, who essentially claim that in order for the innovation to progress in

health care systems, one needs a broad system of support coming from a big variety of stakeholders. Hence, ECHAlliance promotes the creation of multistakeholder ecosystems that are open to anyone who wants to participate, taking special care to involve all key stakeholders, with all stakeholders centering around the patient and citizen.

The next stage in this evolution is the DIH that focuses on navigating the regulatory framework much more than on providing the standard support services offered by the many accelerators and incubators that exist everywhere.

Keywords: Digital Innovation Hub, innovation in health and social care, multistakeholder ecosystems in health and social care, open innovation, international network of ecosystems, support to startup, scaleup and SME innovative companies

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