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2nd International Scientific Conference HealthOnline 2018 - PROGRAMME

PATIENT ENGAGEMENT IN THE DIGITAL ERA - 25. 1. 2018

URA	DOGODEK
8:30-9:00	Registracija / Registration
9:00-9:20	Otvoritev / Opening
9:20-9:50	Plenarno predavanje / Plenary Session: *Dorijan Marušič, Tjaša Zajc* **»TO WHICH EXTENT IS ONLINE HEALTHCARE A POSSIBLE REALITY?«**
9:50-10:20	Plenarno predavanje / Plenary Session: *Alan Šustić* ***»A NEW WORLD OF LEARNING-EUROPE 2020-CLINICAL MEDICINE AT THE GLANCE«***
10:20-10:50	Plenarno predavanje / Plenary Session: Aleksandar Racz, Suzana Marković **»ENHANCING THE VISIBILITY AND ACCESSIBILITY OF ACADEMIC WORK IN THE DIGITAL ERA«**
10:50-11:00	Razprava / Discussion
11:00-11:30	Odmor za kavo / Coffee break
11:30-11:50	Vabljeno predavanje / Invited Lecture: *Natalija Vyatkina* **»THE INTERNET AND HEALTHCARE SYSTEM IN RUSSIA«**
11:50-12:10	Vabljeno predavanje / Invited Lecture: *Ivan Eržen, Dalibor Stanimirović* **»CHALLENGES AND OPPORTUNITIES POSED BY THE DIGITALISATION OF HEALTHCARE«**
12:10-12:30	Vabljeno predavanje / Invited Lecture: *Mate Beštek, Peter Eklund* **»INCREASING PATIENT ENGAGEMENT USING AN EXTENSIBLE OPEN EHEALTH PLATFORM WITH STRUCTURED BEHAVIORAL KNOWLEDGE«**
12:30-12:50	Vabljeno predavanje / Invited Lecture: *Marko Breskvar, Tina V. Vavpotič* **»TELETRANSFUSION - THE BIGGEST TELEMEDICAL PROJECT IN SLOVENIA«**
12:50-13:05	*Ivan Džolan* **»IMPACT OF E-HEALTH ON HEALTHCARE SERVICES«**
13:05-13:15	Razprava / Discussion
13:15-14:45	Kosilo / Lunch
14:45-15:00	*António Oliveira, Rita Capela, Carlos de Freitas, Carlos Ochoa, José Seabra* **»A SMARTPHONE APPLICATION WITH TINNITUS INFORMATION, AS A THERAPEUTIC APPROACH«**

URA	DOGODEK
15:00-15:15	*Eva Dolenc, Damjan Slabe, Uroš Kovačič* **»COMPARISON OF MOBILE FIRST AID APPLICATIONS AND USER SATISFACTION ASSESSMENT USING NETNOGRAPHY«**
15:15-15:30	*Nik Prebil, Čedomir Oblak, Andrej Kansky* **»COMPUTER DESIGNED SURGICAL GUIDES FOR DENTAL IMPLANT PLACEMENT – CASE REPORT«**
15:30-15:45	*Tina Gogova, Marija Milavec Kapun, Andreja Kvas, Pedro Parreira, João Graveto, Paulo Ferreira, Paulo Costa Raija Kokko, Pirjo Vesa, Hilde Vandenhoudt* **»PATIENT EMPOWERMENT WITH MHEALTH APPS«**
15:45-16:00	*Franc Rojko* **»APPROACHES TO THE MODERN IMPLEMENTATION OF DENTAL RESTORATIONS USING DIGITAL TECHNOLOGIES AND THE IMPORTANCE OF THE NECESSARY COMPETENCIES OF MANUFACTURERS«**
16:00-16:15	*Špela Plesec, Uroš Rajkovič* **»A MODEL FOR TELEMONITORING PATIENTS WITH DIABETES IN MODEL PRACTICES«**
16:15-16:25	Razprava / Discussion
16:25-17:00	Odmor za kavo / Coffee break
17:00-17:15	*Saša Šajn Lekše, Bernarda Lončar, Marija Milavec Kapun* **»USING MOODLE IN THE HEALTH EDUCATION OF PATIENTS WITH DIABETES«**
17:15-17:30	*Blaž Ivanc* **»THE RIGHT TO E-HEALTH?«**
17:30-17:45	*Katja Zupančič, Marija Tomšič* **»ELDERLY AND THEIR ATTITUDE TOWARDS TELECARE TECHNOLOGY«**
17:45-18:00	*Nika Pusenjak, Pablo Muñoz* **» AN EVOLUTION OF ONLINE THERAPY APPROACH IN APPLIED PSYCHOPHYSIOLOGY – BIOFEEDBACK AND NEUROFEEDBACK«**
18:00-18:15	*Srećko Gajović, Anna Lydia Svalastog* **»THE IMPORTANCE OF DIGITAL NARRATIVES IN "NAVIGATING KNOWLEDGE LANDSCAPES" TOWARD HEALTH«**
18:15-18:25	Razprava / Discussion
20:00	Slavnostna večerja in druženje s sodelujočimi / Gala dinner

2nd International Scientific Conference HealthOnline 2018 - PROGRAMME

PATIENT ENGAGEMENT IN THE DIGITAL ERA - 26. 1. 2018

URA	DOGODEK
8:30-9:00	Registracija / Registration
9:00-9:30	Plenarno predavanje / Plenary Session *Drago Rudel, Cirila Slemenik Pušnik, Metka Epšek Lenart, Stanislav Pušnik, Zdravko Balorda* ***»TELEMEDICINE SUPPORT RECEIVING FOR A CHRONIC PATIENT AT HOME – ASPECT OF THE PATIENT«***
9:30-10:00	Plenarno predavanje / Plenary Session *Nada Irgolič* **»THE IMPACT OF ONLINE COUNSELING ON THE DRUGS SAFE USE«**
10:00-10:20	Vabljeno predavanje / Invited Lecture *Matija Prka* **»MANUAL PERINEAL PROTECTION AND THE ROLE OF DIGITAL MEDIA AS A TRAINING TOOL«**
10:20-10:40	Vabljeno predavanje / Invited Lecture *Shawnda Morrison* **»THE EFFECTS OF INCREASED SCREEN-TIME ON SLEEP QUALITY IN ADULTS AND CHILDREN«**
10:40-10:50	Razprava / Discussion
10:50-11:20	Odmor za kavo / Coffee break
11:20-11:40	Vabljeno predavanje / Invited Lecture *Dragana Milutinović* **»THE ATTITUDES OF SERBIAN NURSES TOWARDS COMPUTERS IN HEALTHCARE«**
11:40-12:00	Vabljeno predavanje / Invited Lecture *Harald Sourij* **»DIGITALIZATION IN CLINICAL RESEARCH – WE ARE STILL AT THE BEGINNING«**
12:00-12:20	Vabljeno predavanje / Invited Lecture *Jana Šimenc* **»SMART AND HEALTHY: ABOUT INNOVATIONS AND PROGRAMING THE FUTURE«**
12:20-12:35	*Marija Tomšič* **»TECHNOLOGIES VS. OLDER PEOPLE`S QUALITY OF LIFE«**
12:35-12:50	*Judita Peterlin, Tomislav Jukić, Andrej Starc* **»PATIENT EMPOWERMENT IN THE DIGITAL ERA THROUGH THE EYES OF THE HEALTHCARE STUDENTS «**
12:50-13:05	*Ljiljana Radmilo, Dragana Simin, Svetlana Simić* **»THE IMPACT OF COMPUTER USAGE ON THE PREVALENCE OF HEADACHES AMONG SECONDARY NURSING SCHOOL STUDENTS«**

URA	DOGODEK
13:05-13:15	Razprava / Discussion
13:15-14:45	Kosilo / Lunch
14:45-15:00	*Fabio Bonetta, Francesco Mosetti* **»INTERREG PROJECT ITALIA-SLOVENIA CROSSCARE«**
15:00-15:15	*Pina Tratar* **»QUALITY OF HEALTH INFORMATION ON HEART VALVE PROCEDURES ON THE INTERNET IN SLOVENIAN LANGUAGE«**
15:30-15:45	*Elma Subašić* **»OPTIMAGE AS SOFTWARE SOLUTION FOR IMAGE QUALITY CONTROL IN COMPUTED TOMOGRAPHY«**
15:45-16:00	*Nevenka Gričar, Andreja Bartolac, Claire A. Sangster Jokić* **»THE EXPOSURE OF PRESCHOOL CHILDREN TO TECHNOLOGY AND ITS RELATIONSHIP TO CHILDREN'S PLAY«**
16:00-16:15	*Alenka Plemelj Mohorič* **»REDUCING SEDENTARY TIME«**
16:15-16:30	*Mateja Dovjak, Masanori Shukuya, Aleš Krainer* **»ACTIVE ROLE OF USER IN DESIGNING OF HOSPITAL ENVIRONMENT.«**
16:30-16:40	Razprava / Discussion
16:40-17:10	Odmor za kavo / Coffee break
17:10-17:25	*Rok Drnovšek, Marija Milavec Kapun* **»VIRTUAL REALITY IN HEALTHCARE: LITERATURE REVIEW WITH BIBLIOGRAPHIC COUPLING ANALYSIS«**
17:25-17:40	*Vesna Božiček* **» THE INFLUENCE OF MODERN DIGITAL INFORMATION SOURCES ON PARENTS' DECISION ON CHILD VACCINATION: PRO ET CONTRA«**
17:40-17:55	*Mojca Kralj* **»USE OF WEBSITES IN HEALTH EDUCATION OF ADOLESCENTS WITH SPECIAL NEEDS«**
17:55-18:10	*Eva Uršej* **»USE OF VIDEO-GUIDED WORKOUTS AT A WORKPLACE«**
18:10-18:25	*Vesna Božiček* **»THE INFLUENCE OF MODERN DIGITAL INFORMATION SOURCES ON RESPONSIVENESS AND PARTICIPATION IN CANCER SCREENING TESTS«**
18:25-18:35	Razprava / Discussion
18.35	Zaključek konference / Conclusion of the Conference

KAZALO VSEBINE – PRISPEVKI / CONTENT – COMPLETE PAPERS

Prispevki s strokovno recenzijo
Selection of papers with peer review

KAZALO VSEBINE – IZVLEČKI / CONTENT – ABSTRACTS

Izvlečki
Abstracts

PRISPEVKI S STROKOVNO RECENZIJO

SELECTION OF PAPERS WITH PEER REVIEW

INCREASING PATIENT ENGAGEMENT USING AN EXTENSIBLE OPEN EHEALTH PLATFORM WITH STRUCTURED BEHAVIORAL KNOWLEDGE

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Abstract

Introduction: *Open eHealth platforms can, by offering a core of seed services, become the basis for national eHealth initiatives by supporting communication between many networks that exist in a typical healthcare system. In order to achieve better engagement of end users, focus should be put on structured behavioral knowledge in different health interventions.*
Methods: *A conceptual framework for defining adaptive preventive interventions is described and used to represent how this can be implemented with an industry standard – BPMN2. This is used as the basis for extending the national open eHealth platform with structured behavioral knowledge.*
Results: *We depict the growing importance of behavioral knowledge in health interventions, delivered via Internet, and also identify different knowledge, based on using psychological theories, as a basis for designing new health interventions. In addition, the results of a case study are presented to demonstrate how such knowledge can be delivered as distributed care processes as an extension to the national open eHealth platform.*
Discussion: *Since healthcare systems suffer sustainability issues due to demographic changes, distributed ICT supported health interventions outside of hospitals are prone to failure because they do not take into account knowledge of human behavior in the design phase. Addressing this issue holds the promise of increasing patient adherence with care plans, better communication with healthcare professionals and improved design of public health programs.*

Keywords: *open eHealth platforms, health interventions, behavior change, distributed care processes*

Introduction

Implementing national eHealth is a difficult to manage activity (Stroetmann, et al., 2011; Informatics, 2017). Due to being high cost and time consuming, it is difficult to cooperate with resident practitioners. Treating the national eHealth as a ‘platform’ could allow more effective resource allocation. The primary role of platforms are to establish market functions for eHealth services and to overcome the traditional lock-in from solutions providers. In general, platforms can be defined as “products and services that bring together groups of users in two-sided

networks" (Eisenmann, Parker and Alstyne, 2006). Open platforms suggest a structured component-based service architecture that encourage participation. Open platforms are believed to be enablers of the 'platforms ecosystems concept'. Ecosystems in general are inter-organizational networks (Benedict, 2018). In the context of platforms, ecosystems represent the platform and all the applications specific to the platform (Tiwana, 2014).

The vision of a unified, interoperable eHealth infrastructure in Europe is still not realized (Informatics, 2017). The driving force for ICT in healthcare has been the trend toward a better coordination of care (Winter, et al., 2011; Aanestad et al., 2017). As part of the digital transformation process, typical care processes are becoming more integrated, not only in healthcare but also other contexts, such as social care and the environment of the patient's home. Further, such integrated care processes are becoming personalized adaptive care pathways (Gand and Schlieter, no date; Schrijvers, Hoorn and Huiskes, 2012; Schlieter, et al., 2017).

Digital transformation can be seen as a cultural transformation of patients, doctors, and nurses. Changing human behavior is complex and a shift from solutions to interventions is needed, suggesting a switch from the traditional search for solutions for specific problems towards interventions - a continuous process of action. Over the past decades, psychology has accumulated an extensive toolbox of behavior change techniques and has accumulated evidence of their effectiveness (Abraham and Michie, 2008; Michie, van Stralen and West, 2011; Peters, de Bruin, and Crutzen, 2015) as cited in (Raghallaigh and Adam, 2017). These techniques have been used to design theory based health interventions that were more optimal in terms of how well the patients were able to achieve desired behavioral and/or outcomes (e.g. smoking cessation). As noted in (Holman, Lynch and Reeves, 2017), the only way to solve complex societal challenges is through interdisciplinary work, a deep interdisciplinary collaboration between health psychology, computer science, health informatics, cognitive science, and an educational methodology is needed in order to research interaction between different technology components, in order to use the potentials of information technology in behavior research (Catriona M. Kennedy, et al., 2012). This points towards viewing information technology as supporting dynamic and adaptive information processing instead of viewing it as a traditional passive medium focused on efficient transmission of information and a positive user experience (Catriona M Kennedy, et al., 2012). Interventions that support behavior change have lately been named Digitally Based Change Interventions (Raghallaigh and Adam, 2017) - automated, interactive, and personalized 'just-in-time' adaptive interventions – JITAIs (Nahum-shani, et al., 2014; Pavel, et al., 2015; Nahum-Shani, et al., 2016; Moller, et al., 2017). JITAIs are intervention protocols, labeled also as computerized behavioral protocols (Lenert, et al., 2005) that could represent reusable components (interventions). Authors in (Lenert, et al., 2005) have formally defined one such protocol and computerized it by using an ontology and define a 'protocol' as a behavior change program that may be implemented in clinical, worksite, home or school settings that combines multiple modes for changing behavior. Behavioral knowledge has been used for supporting behavior change with patients (Curtis, Lahiri and Brown, 2015; Curtis, Atkins and Brown, 2017), for addressing the issue of communicating to healthcare professionals (Perkins, et al., 2007), and to deploy more effective public health programs (Glanz and Bishop, 2010). Computerizing

behavior knowledge is also the basis of the behavior change support systems (Oinas-Kukkonen, 2012) and is a term coined for the purpose of describing software systems that implement behavioral knowledge. An example of using structured behavioral knowledge in the form of a medical ontology has been used in (Bickmore, Schulman and Sidner, 2011) to support a health counseling dialogue system.

In this article, we present a case study where business process models were used for representing different care protocols (e.g. asthma care protocol) that were evaluated in a clinical trial. The clinical trial was conducted during the eCare (University of Primorska, Slovenian Research Agency, 2010) project. The clinical trial lasted for a year and included patients at home, and medical professionals at Golnik Clinic for Respiratory Disease in Slovenia. These models could be added to the national eHealth platform as core components that could be approved by the health technology acceptance process. Different ecosystem participants could use the validated core processes as the basis for creating new integrated care solutions in which these validated protocols could play a role in gaining knowledge about how to achieve better engagement and lower fatigue in different interventions.

Methods

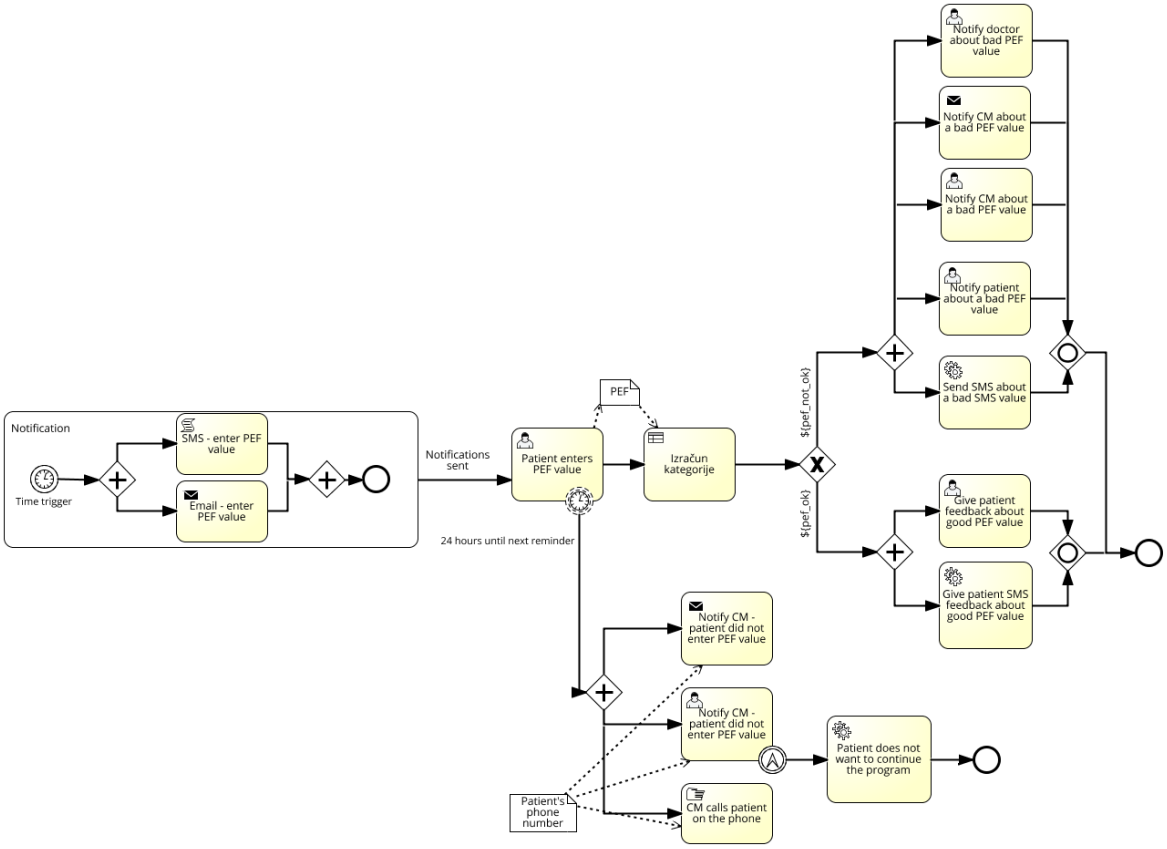
We present and use the conceptual framework for adaptive preventive interventions (Nahum-Shani, et al., 2016) in order to highlight the main components of behavioural interventions in general (decision points, interventions options, tailoring variables, and decision rules) and provide specific components that were implemented in our case study intervention and also show what behavioural knowledge we used and how was it used. Through this, we show how the conceptual framework can be implemented in order to become part of the extendable core services of the national eHealth platform.

Results

Our case study project focused on patients with different conditions (asthma, diabetes and obesity). Greater details about the project and the developed system together with the results of the clinical trial focused on patients with type 2 diabetes are described in previous publications (Beštek and Brodnik, 2014; Beštek, Curtis and Brodnik, 2015; Iljaž, et al., 2017). In addition, we want to present the eAsthma use case that was also supported in this project.

The selected case of the eCare project was to support the process of care for patients while they were at home. The care process thus includes patients, doctors and nurses who played the role of care managers. The care process represents a protocol that precisely defines the flow of actions together with participating roles. This includes actions like performing measurements at home, completing questionnaires, or sending the patient to a laboratory to do some tests. Such process models were then used directly in an information-communication system that was able to execute the process as defined. The execution of these processes is the enactment of the protocol.

Picture 1 shows a simple process model that depicts the main steps of the process and how these are connected.



Picture 1. A process model depicting notifications of patients, doctors and nurses (Care managers – CM) in the process of creating a new PEF measurement of Asthma patients

The conceptual framework as defined in (Collins, Murphy and Bierman, 2004), and cited in (Nahum-Shani, et al., 2016), defines four main components of interventions. (1) Decision points, (2) Interventions options, (3) Tailoring variables, and (4) Decision rules.

Decision point represents the time when an intervention decision is made. Time can be either a predefined time interval, a specific time of the day, or after random prompts. An example decision point would be immediately after a patient is , for example, shown a questionnaire. Depending on the answers, a different intervention can be enacted. The process shown in Picture 1 contains several decision points that are depicted in a BPMN2 syntax (e.g. the process starts when a predefined time trigger occurs).

Intervention options represent a set of treatments or actions that can be enacted at any decision point. In our process, intervention options include reminders over SMS and email, phone calls, and tailored feedback.

Tailoring variables are information about an individual that is used to decide when to provide an intervention and which to provide. Our use case process is focused on peak flow measurements of asthma patients which in turn represents the main tailoring variable.

Decision rules operationalize the adaptation (personalization) by defining which intervention option to offer, for whom and when. Each decision point has a decision rule defined, which in

turn connects intervention options with tailoring variables. Our process uses BPMN2 syntax to define all the decision rules by connecting tailoring variables with intervention options to be used at certain decision points.

Generally, interventions are designed for the purpose of achieving two types of goals. The ultimate intervention goals e.g. smoking cessation, are defined as distal outcomes. In our case, managed asthma is a long-term distal outcome. The other type of goals is defined as proximal outcomes and represent smaller steps that are needed in order to reach the ultimate goal and can be behavioural, cognitive or affective. These address the issues of adherence. Design principles for intervention options target engagement.

Discussion

We have presented a conceptual framework for defining behavioural interventions. We used the eAsthma use case, specifically a BPMN2 based process model that described a specific set of intervention options of the eAsthma care protocol that focused on peak flow measurement in order to show that the conceptual framework can easily be mapped to an industry standard that could become the basis for extending the core services of the national eHealth platform. The models could represent, for example,. clinically validated care protocols that could then be used by different applications provided by different providers. With this, structured behavioural knowledge could become part of the national eHealth open platform that would enable the creation of behavioural theory grounded applications that would represent targeted interventions both for individual patients as well as patient populations. Such approaches promise not only a higher level of adherence but also reduced costs – both direct (more users means less per user costs) and indirect (healthier patients mean less costs for the healthcare system). Such approaches are lately being tested (Larsen *et al.*, 2016; Michie *et al.*, 2017) in order to create an ontology of behaviour change techniques that could then serve the purpose mentioned in this paper.

Conclusion

During the time of the design phase of our project, a taxonomy of behaviour change techniques represented the structured behavioural knowledge that was available (Abraham and Michie, 2008). Lately, there has been more progress in this field so that now one can use more sophisticated and highly expressive ontologies (Larsen, et al., 2017). Such structured behavioural knowledge brings a higher level of semantics that allow computer programs to become more effective and efficient. Incorporating artificial intelligence and machine learning algorithms into the process of ontology development can support a learning system that creates new knowledge based on evidence (Michie, et al., 2017).

In this article, we presented a case study where business process models were used for representing different care protocols (e.g. asthma care protocol) that were evaluated in a clinical trial. These models could be added to the national eHealth platform as core components that could be validated in clinical trials and approved by the health technology acceptance process. Different ecosystem participants could use the validated core processes as the basis for creating

new integrated care solutions in which these validated protocols could provide knowledge about how to achieve higher adherence and better engagement in different interventions focused on patients, in communicating with healthcare professionals, and designing more effective public health programs.

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COMPARISON OF MOBILE FIRST AID APPLICATIONS AND USER SATISFACTION ASSESSMENT USING NETNOGRAPHY

PRIMERJAVA MOBILNIH APLIKACIJ PRVE POMOČI IN UGOTAVLJANJE ZADOVOLJSTVA UPORABNIKOV Z UPORABO NETNOGRAFIJE

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Abstract

Introduction: *Mobile applications with first aid contents are tools in the field of health promotion focusing on health education interacting with aid or self-aid in cases of injuries or sudden illnesses. There are many versions of mobile applications available, in the past few years also in Slovene. Due to the need for their upgrading and further development, they have to be evaluated from various aspects, especially from the perspective of the users' satisfaction.* ***Methods:*** *The two mobile applications in Europe, created in cooperation with the National Red Cross (the Slovene and the English version), have been compared according to the users' satisfaction database using the tools of netnography through observation, but without active participation in the Google Play online store. The database comprised clicks and posts from users of Mobile Apps First Aid or First Aid, provided on two Google Play store sites from which users installed the mobile apps and delivered their opinions, suggestions, or ratings. The survey included 252 posts (172 for the English and 80 for Slovene version ranging from October 2013 to September 2017. The data for the analysis and interpretation of the results were coded by the key PMI (plus, minus, interesting) and the corresponding subcategories.* ***Results:*** *Approximately 50,000 to 100,000 users installed mobile application Prva pomoč while approximately 100,000 to 500,000 users installed mobile application First Aid. The average rating of 794 users of mobile application in Slovene is 4.5/5, while for the English one the average rating of 4820 people was 4.7/5. The versions vary in content: the English one is more extensive, covering themes from first aid kit, prevention, emergency, and some other functions (e.g. knowledge testing). The users are laypersons, semi-professionals and health workers. The users' posts prevalently praise versatile aspects of both applications. They also cite some faults regarding technical characteristics, but basically, they recommend and propose suggestions on content enhancements and improvements.* ***Discussion:*** *Mobile applications related to first aid topics are generally very well accepted, which obliges developers to upgrade applications related to this field.*

Keywords: *mobile application, first aid, user's opinions, netnography*

Izvleček

Uvod: *Mobilne aplikacije z vsebinami prve pomoči so pripomočki s področja promocije zdravja, ki se osredotočajo na zdravstveno vzgojo, vzajemno pomoč in samopomoč v primeru poškodbe ali nenadnega obolenja. Dostopne so številne različice mobilnih aplikacij, zadnjih nekaj let tudi v slovenskem jeziku. Zaradi potreb po njihovi nadgradnji in nadaljnjem razvoju morajo biti evalvirane z različnih vidikov, še zlasti v luči zadovoljstva uporabnikov.*

Metode: *Dve mobilni aplikaciji na temo prve pomoči v Evropi, nastali v sodelovanju z nacionalnim Rdečim križem (slovenska in angleška različica), sta bili primerjani z zbiranjem podatkov o zadovoljstvu uporabnikov z uporabo metodologije netnografije, z opazovanjem brez aktivne udeležbe v spletni trgovini Google Play. Podatki so bili kliki in objave uporabnikov mobilnih aplikacij Prva pomoč ali First Aid, podane na dveh spletnih straneh trgovine Google Play, s katerih so si uporabniki namestili mobilno aplikacijo in tam podali svoje mnenje, predloge ali oceno. V raziskavo je bilo vključenih 252 objav (172 za tujo in 80 za slovensko) iz časovnega obdobja od oktobra 2013 do septembra 2017. Kodiranje podatkov za analizo in interpretacijo rezultatov je potekalo po ključu PMI (plusi, minusi, interesantno) s pripadajočimi podkategorijami.*

Rezultati: *Mobilna aplikacija Prva pomoč beleži med približno 50.000 in 100.000 namestitev, First Aid pa med približno 100.000 in 500.000. Povprečna ocena 794 uporabnikov mobilne aplikacije v slovenskem jeziku je 4,5/5, 4820 oseb pa je aplikacijo v angleškem jeziku ocenilo v povprečju s 4,7/5. Aplikaciji se razlikujeta po obsegu vsebine: angleška zajema obsežnejši tematski sklop prve pomoči, preventive, izrednih razmer in nekatere druge funkcije (npr. preverjanje znanja). Uporabniki so laiki, polprofesionalci in zdravstveni delavci. Objave uporabnikov so v večini pohvale obeh aplikacij z več vidikov. Navajajo tudi nekaj kritik glede tehničnih lastnosti, vendar v splošnem aplikacijo priporočajo ter podajajo tudi predloge o vsebinski razširitvi in izboljšavah.*

Razprava: *Mobilne aplikacije na temo prve pomoči so med ljudmi zelo dobro sprejete, kar še dodatno zavezuje snovalce k nadgradnji na tem področju.*

Ključne besede: mobilna aplikacija, prva pomoč, mnenja uporabnikov, netnografija

Introduction

The World Health Organization (WHO, 2011) emphasizes that the application of mobile and wireless technology in the health sector is significantly changing the global health system. At the same time, it concludes that most member states use at least one of the so-called "mobile health" (mHealth) services, and that trend of using them is increasing. The number of smartphone users is anticipated to increase from 2.1 billion in 2016 to 2.5 billion in 2019 (Statista, 2016).

In the field of first aid, numerous versions of mobile applications are available, in the last few years also in the Slovenian language (Google play, 2017a). These are health promotion tools that focus on the content and functions of mutual assistance and self-help in case of injury or sudden illness. Services of mHealth help to realize the basic goals of first aid, which are 1. to

save life, 2. to prevent the worsening of health condition, and 3. to provide professional help (Derganc, 1994). The mHealth allows the patient greater control of the disease and thus greater autonomy, thus helping to prevent health problems (European Commission, 2014). Researchers conclude that mobile applications, including the first aid application, have positive effects in improving human everyday life, health management and disease treatment (Zhang, et al., 2017). In addition to highlighting the great advantages of mHealth, the WHO also emphasizes the importance of evaluating mHealth for further development and efficiency of eHealth.

Despite the high incidence of mobile applications, the percentage of countries that they formally assessed applications is barely 12 % (WHO, 2011). Due to the need for upgrading and further development, we also need to evaluate mobile applications on the topic of first aid. In the survey, we compared two mobile applications originating in Europe, the first in cooperation with the Slovenian Red Cross - the application Prva pomoč, created in 2013, and the second, which was designed with the British Red Cross - the application First Aid, an updated version from 2016. Both are evaluated from several aspects with a focus on determining customer satisfaction. The purpose of the comparison of applications was to offer suggestions for upgrading and improving the Slovenian application. The aim of the study was also to identify the similarities and differences between mobile applications Prva pomoč and First aid according to content, ratings and user opinions.

Methods

The data for analysis were obtained using the method of netnography (Kozinets, 2010). In the present survey, the observation technique was used without active participation in the Google Play Store. In this case, the observer ("lurker") is the one, who only observes the communication between the participants on the web and does not actively participate in it (Kozinets, 2010). The data were clicks and posts from users of mobile applications Prva pomoč or First Aid, provided on the Google Play Store website from where users installed the mobile applications and delivered their opinions, suggestions or ratings.

The survey included 252 posts (172 for foreign and 80 for Slovene application), published by users in the period from October 2013 to September 2017 for the Slovenian application, and from March 2016 to September 2017 for English application. The inclusion criteria were all posts for the Prva pomoč application and the latest and most useful posts (option to choose according to the criterion "most useful post" enabled by Google Play) for the First aid application. All posts were analysed in October 2017. The users are registered voluntarily on the website and they agreed with the conditions (also on non-anonymity) at registration. The coding of the data for the analysis was carried out by the PMI key (plus - praises, minus - remarks and interesting - suggestions) (De Bono, 1985) with the corresponding subcategories. The data for comparing the selected objective criteria were obtained from Google Play sites (2017a, 2017b). The method used in presenting the data ensured the users' anonymity.

Results

According to the Google Play data (2017a), the Prva pomoč mobile application has between 50,000 and 100,000 installations. The exact number of installations is not known. The First aid application has between approximately 100,000 and 500,000 installations (Google Play, 2017b). At the time of the analysis (October 2017), the average score of 794 mobile application Prva pomoč users was 4.5 out of possible 5, while 4820 people rated the First aid application (October 2017) with average of 4.7 out of possible 5.

Applications are similar in content. The latter is provided in text, image and video formats, and in the First aid application also in the form of animations. The First aid application covers a wider range of content than the Prva pomoč application. The content is organized differently (e.g. burn wounds are placed in the menu "Preparing for an accident - fire" in the English application). Mobile applications also have distinct functions. The Slovene one has a basic menu, which is designed as a list of urgent measures. In addition, the most frequent questions and answers are given within the individual measure, which are intended for deepening the knowledge of first aid. The First Aid application has several categories (tabs) in the basic menu: learning categories, preparing for disasters, emergency measures and tests for examining knowledge.

Application users are laypersons, semi- professionals (e.g. rescuer from water) and health professionals. In their comments, they identified themselves as: "... a leader of the employees in a working organization I made sure that all employees installed the First Aid Application ..." or "... ambulance crew ..." or "... a licensed first-aid teacher I think... ". The users are participants of the first aid course, medical students, firefighters, rescuers, heads organizations, water rescuers, first aid instructors, swimming teachers, laypeople without first aid knowledge and other.

The users' statements were classified into three categories: praises (plus), remarks (minus) and suggestions (interesting) with the corresponding subcategories. For both applications, the user's posts expressing praise prevail (Table 1). The praises are mainly: general praises, praises regarding its usefulness and recommendations for using the application (Table 2).

Table 1. Quantitative comparison of the opinions of the users of mobile applications Prva pomoč and First aid

	THE NAME OF THE APPLICATION	
USER OPINIONS*	Prva pomoč	First aid
number of analysed opinions	80	172
number of positive opinions n (%)	70 (88 %)	164 (95 %)
number of negative opinions, citing problems	6	3
number of proposals	5	15

* Opinions comprising multiple categories are also included (for example, a proposal and a negative opinion at the same time).

Table 2. Qualitative comparison of the opinions of users of mobile applications Prva pomoč and First aid in the category of praises

PRAISE CATEGORY (PLUS)		
SUBCATEGORY	Application Prva pomoč	Application First aid
	Keyword opinions	
general praise	great, new, very good, you will not regret, excellent, very nice, useful, the best, top, interesting, thank you, great praise, I recommend, you made an effort, accurate, instructive, find out everything, in Slovenian language, beneficially, free, convenient, practical, OK, fine, compulsory, cool, transparent, smart, law, good job, +, in a dot	brilliant, good, essential, great, first class, no excuses for not getting it, simple information, excellent, good, informative, thank you, a must have app, gr8, best app, love this, 5 stars, handy, easy, the most useful app on the phone, easy to use, well structured, very important, successful, thank you, recommend, amazing, precise, uncomplicated, suitable, fantastic, covers all areas, reliable information, pictures, videos, free, you do not need permissions, in-depth, organized, realistic, funny
usefulness	useful, to help yourself, to help others, to maintain a high level of knowledge, in an accident, to learn, in an emergency, to learn when a person is in need, in everyday life, useful, handy, to refresh knowledge	useful, to help others, to guide, for first-aid training, to test knowledge, can save lives, improve responsiveness, for refreshing the knowledge, for reacting in situations, as material during a course, a source of information, increase knowledge, immediate access to emergency, could reduce costs in health care, if it was used more often, on a train or bus, for reading, for fun, also for those who did not have first aid training, at work, as a preparation for a first aid course, to control, you can review what you did right and what you did wrong, reduce the possibility for panic, in the most common disasters, tests, videos, to call 911
recommendation for use	for everyone interested in medicine, for everyone interested in first aid, lay people and professionals, everyone	for everyone, for first aid course attenders, for those who do not help in accidents, for people of all ages, for those who do not have the knowledge, for schoolchildren, for employees, for medical staff, for those who have not attended courses, for children, for those who are uncertain, for those who are outside a lot

Users also cited some general criticism and substantive and technical remarks (Table 3).

Table 3. Qualitative comparison of the opinions of users of mobile applications Prva pomoč and First aid in the category of remarks.

COMMENTS CATEGORY (MINUS)		
subcategory	Application Prva pomoč	Application First aid
	keywords (opinions)	
general	just something	too simplified
substantive	/	not updated with guidelines, an error in the instructions for asthmatic attack, there is not the case of drowning, drowning is not included, tests are too easy
technical	disabled access due to ad, can not be updated, too small letters, couple of things cannot be opened, can't download	it is impossible to complete a test, poor quality of videos

The users' suggestions for improving Prva pomoč and First Aid applications are also general, substantive and technical (Table 4).

Table 4. Qualitative comparison of the opinions of users of mobile applications Prva pomoč and First aid in the category of proposals

SUGGESTIONS CATEGORY (INTERESTING)		
subcategory	Application Prva pomoč	Application First aid
	keywords (opinions)	
general	everyone can have it, should have been more of this type of applications, promote it	it is good to be used in conjunction with St Johns Ambulance application, everyone should have it, could be used for tests, could be recommended in schools, download it on the personal or business mobile phone, this should be a standard, first aid should be in the curriculum of national schools
substantive	add more accidents, add hyperthermia	there should be a summary of the key steps, update the guidelines for asthma, make a clear difference between bronchodilatators and other medicines, update the area of terrorist attacks to keep it up-to-date in accordance with the guidelines
technical	/	the results of the test could be sent to the email, the results of the test could be printed as a proof that you have refreshed the first aid knowledge, that you have it loaded

Discussion

Both analysed mobile applications on the topic of first aid are purposely similar. The benefits of the First aid mobile application are that the content set is more extensive than in the Prva pomoč application as it also covers the typical injuries resulting from certain accidents. It also offers the possibility of examining knowledge. The first-aid training and emergency response functions are separate. The application is visually richer, since it has icons that associate to certain states and animations. In regards to content, the applications exhibit some essential differences. The Slovenian version includes first-aid guidelines for amputation (finger), spinal cord injury, eyes and teeth injuries. The English version includes first-aid instructions for asthma, hypothermia, meningitis and a wider range of other contents in the "disaster preparedness" and "check your knowledge" functions.

The users' opinions of both applications are mostly positive, in 88% for the Slovene and in 95% for the English applications (Table 1). Similarly, the average estimates are also high; 4.5 and 4.7, respectively. The main disadvantage in Slovenian application Prva pomoč is that it has not been updated or upgraded in the four years of use. In upgrading it, it is recommendable to follow the English First Aid application and add the missing instructions for first aid in the event of injuries and illnesses. It would also be reasonable to add the possibility of interactive quizzes praised by foreign app users (Table 2). In addition to the stated purpose of applications (acquiring and refreshing knowledge, acting in situations), the users proposed some other possibilities of its usage, such as useful material during the course, for reading on the train or bus, for a short term, at the workplace, as a pre-preparation for the first aid course and other (Table 4). The users' suggestions for future improvements are: mobile phones should have application preloaded, multi-purpose usage, expanded content, additional options (e.g. e-mail connection) and promotion. These proposals should be observed by Prva pomoč and First aid mobile application developers. These ideas supported by the number of downloaded applications, compliments and good user ratings. The users are laypersons, semi-professionals (e.g. rescuers from water) and professional ambulance crew assistants, who present a variety of users and whose opinions should be taken into consideration.

The weaknesses highlighted by users of both applications should be avoided (Table 3). These inadequacies include some technical problems (e.g. "do not install"), which is the general disadvantage of information and communication technology. The applications require appropriate expert review and updating to avoid content errors and to ensure the up-to-date first aid guidelines, which change only in the field of resuscitation every 5 years (ERC, 2015). This means that the application should be updated every five years, and technically even more frequently.

Musigdilok et al. (2015) also points to the importance of related mobile applications on the topic of first aid, because they noticed an increased use of mobile applications by the American Red Cross during a tornado. German mobile application M-AID helps people to approach an injured person and reduce their fear of doing anything wrong (Zanner, et al., 2007). Researchers emphasize that there is a possibility to use mobile applications to increase the resistance of

individuals and communities, as applications provide information for support and help before, during and after disasters (Theodoromanolakis, et al., 2013).

Conclusion

First-aid applications on mobile phones cannot replace knowledge acquired through practical experience, but they contribute to more successful implementation of basic resuscitation procedures and other first aid measures (Zanner, et al., 2007). Applications are important in terms of disseminating knowledge about first aid, but it should be noted that users should not rely on their use in case of emergency situations that require immediate action. Positive user reviews of Prva pomoč and First-aid applications may stimulate future development and improvement of mobile applications on the first aid subject.

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ACTIVE ROLE OF THE USERS IN DESIGNING HOSPITAL ENVIRONMENT

AKTIVNA VLOGA UPORABNIKA PROSTORA PRI NAČRTOVANJU BOLNIŠNIČNEGA OKOLJA

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Abstract

Introduction: *Energy Efficiency Directive (2012/27/EU) requires that every year, starting from January 1, 2014, the governments of the EU member states carry out energy efficient renovations in at least 3% (by floor area) of the buildings they own and occupy, including healthcare facilities. Today's trend of building design is in the direction of unilateral achievement of highly energy efficient buildings and that, as a rule, results in deteriorated indoor environmental quality. In highly demanding hospital environment, deteriorated indoor environmental quality is reflected in unhealthy and uncomfortable conditions for patients and staff as well as consequential economic impacts of longer hospitalization times and increased absenteeism. Hospital design does not follow the needs and demands of a specific user, which is especially important in such complex internal environment with vulnerable population groups. The purpose of this paper is to present the functioning of an innovative control system of microclimate conditions the design of which is based on the needs and demands of individual user of the active space.*

Methods: *The system operation was tested in a test room for a burn patient. A combination of measurements of microclimate parameters, and simulations of thermodynamic responses of users was carried out with a software tool by Asada, 2009.*

Results: *Measurements and simulations showed that an innovative system allows optimal regulation of the human body exergy balance towards the direction of reaching stimulative conditions for the healthcare and recovery as well as simultaneous achievement of thermal comfortable conditions for other users.*

Discussion: *The design of built environment, which places the individual user of space at the forefront, results in healthy, comfortable and stimulating conditions with minimal possible use of energy for its operation.*

Keywords: *hospital environment, reference environment, stimulating conditions*

Izvleček

Uvod: *Direktiva 2012/27/EU o energetski učinkovitosti zahteva, da se od 1. januarja 2014 vsako leto prenovijo 3 % skupne tlorisne površine stavb v lasti in rabi osrednje vlade, kamor prištevamo tudi zdravstvene objekte. Današnji trend novogradenj in prenov je v smeri enostranskega doseganja visoke energetske učinkovitosti objektov, ki povzroči po pravilu poslabšanje kakovosti notranjega okolja. To se odrazi v nezdravih in neudobnih notranjih razmerah posledica katerih so poleg negativnega vpliva na paciente in osebje tudi ekonomski vplivi, ki jih generirajo daljše hospitalizacijske dobe. Tako načrtovanje stavb ne izhaja iz zahtev in potreb specifičnega uporabnika, kar je še kako pomembno v kompleksnih notranjih okoljih bolnišnic. Namen prispevka je prikazati delovanje inovativnega sistema regulacije mikroklime.*

Metode: *Delovanje sistema je bilo preizkušeno v testni sobi za opeklinskega bolnika. Izvedena je bila kombinacija meritev mikroklimatskih parametrov in simulacij termodinamskega odziva uporabnikov s programskim orodjem (Asada, 2009).*

Rezultati: *Meritve in simulacije so pokazale, da inovativen sistem omogoča optimalno regulacijo eksergijske bilance v človeškem telesu v smeri dosega stimulirajočih razmer za zdravljenje in okrevanje.*

Razprava: *Načrtovanje grajenega okolja, ki v ospredje postavi individualnega uporabnika prostora, rezultira v zdravih, udobnih in stimulirajočih razmerah ob minimalni možni rabi energije za njegovo delovanje.*

Ključne besede: bolnišnično okolje, referenčno okolje, stimulirajoče razmere

Introduction

Non-residential buildings account for 25 % of the total stock in Europe and comprise a more complex and heterogeneous sector compared to the residential one (BPIE, 2011). Hospitals are the largest non-residential buildings and amount to 7 % of the total non-residential floor space (on average over 1 000 m^2 in floor area per building). Hospitals are buildings with continuous usage patterns, where energy demand can vary substantially, depending on the services provided (from consultation rooms to surgery rooms). Statistical data in EU (BPIE, 2011) reveal that 10% of final energy use in non-residential buildings in EU is consumed by hospitals. Specific energy use in EU hospital is approximately 280-430 kWh/(m^2a). Energy Efficiency Directive (2012/27/EU) requires that every year since 1st January 2014, governments in EU countries carry out energy efficient renovations on at least 3% (floor area) of the buildings they own and occupy, including healthcare facilities. Today's trend of building design is in the direction of unilateral achievement of highly energy efficient buildings and that, as a rule, results in deteriorated indoor environmental quality. This is reflected in unhealthy and uncomfortable conditions, which negatively affects the patients' health outcomes and the staff. It also has economic impacts of longer hospitalization times and consequently increased absenteeism. Building design does not follow the requirements and needs of a specific user, which is especially important in complex internal environments, such as hospitals.

A hospital presents a highly demanding environment created by users' requirements, environmental factors and specific activities. In hospital environment, various users are present with different demands and needs (Dovjak, 2012). Current design of hospital environment with conventional heating, ventilation and air-conditioning systems is based on the requirements of an average user and is not optimal for the selected individual user. For example, recommended air temperature ranges from 20 °C to 26 °C, depending on the specifics of the type of ward facility (ASHRAE 170: 2008). A human being's thermal sensation is influenced by metabolic rate and clothing, as well as the environmental parameters, individual characteristics, and health status (Dovjak, 2012; Hwang, et al., 2007). The effect of gender, age, acclimatization and health status on individual perception of thermal comfort conditions has been proven in general indoor environments as well as in hospitals. In the study by Karjalainen (2007), performed in general environment, significant gender differences in thermal comfort, temperature preference, and use of thermostats were identified. Besides gender, age of the users has an important role in defining optimal thermal conditions (Nam, et al., 2015). Schellen et al. (2010) claim that the elderly preferred a higher temperature in comparison to young adults. Despite the findings of the above studies (Karjalainen 2007, Nam, et al., 2015, Schellen et al., 2010), literature survey of human comfort in indoor environments by Frontczak and Wargocki (2011) showed slightly different results. Authors concluded that thermal comfort was influenced by the level of education, the relationship with superiors and colleagues and time pressure, but not by gender, age, body built, fitness, health, self-estimated environmental sensitivity, menstruation cycle, pattern of smoking and coffee drinking, job stress or weekly working hours. A significant effect of gender, age, acclimatization and health status on individual perception of thermal comfort conditions has also been proven by studies in hospitals (Hwang, et al., 2007; Pourshaghaghy and Omidvari, 2012; Skoog, 2006; Wallace, et al., 1994). According to individual differences on perception of thermal environment, the heating and cooling system shall distinguish the required conditions for patients (healing oriented conditions, conditions important for their health care and treatment), and thermal comfort for staff and visitors. The same conclusion was reached by Sadrizadeh and Loomans (2016) and Khodakarami and Nasrollahi (2012). They highlighted that it is important to find acceptable solutions for various thermal comfort requirements.

The purpose of this paper is to present the functioning of an innovative control system of microclimate conditions. The system operation was tested in a test room for a burn patient and compared to a conventional system. A combination of measurements of microclimate parameters and simulations of thermodynamic responses of three users was performed. The research questions were: (1) Does the innovative control system of microclimate conditions enable the creation of optimal conditions for burn patient and thermal comfort conditions for health care worker and visitors? (2) Can regulation of separate parts of human body exergy balance be achieved by setting the innovative control system? (3) Is it possible to create optimal conditions for individual user of active space with conventional system?

Method

A series of experiments was carried out in a real test room (7.5 x 5.0 x 4.0 m) that presents a model room for burn patient. It is located at the Chair for Buildings and Constructional

Complexes, Faculty of Civil and Geodetic Engineering, University of Ljubljana. The room is equipped with an innovative control system and a conventional system.

The selected parameters for monitoring were indoor air temperature and relative air humidity (T_{ai}, RH_{in}), outdoor air temperature and relative air humidity (T_{ao}, RH_{out}), surface temperatures, black globe temperature, and temperature of the medium in panels. Three users (burn patient, healthcare worker, visitor) were selected for the simulation of individual thermal comfort conditions. From the relevant sources of literature (Dovjak, 2012), characteristics for a burn patient were chosen: 80 % TBSA (percentage of the total body surface area that is affected by a burn), hypermetabolic state (2 met), hypothermia (body core temperature T_{cr} 35.5 °C, skin temperature T_{sk}37.0 °C). Characteristics for health care worker were: metabolic rate 1.1 met, 0.6 effective clothing insulation. Characteristics for a visitor were: metabolic rate 2.0 met, 0.6 effective clothing insulation. T_{sk} and T_{cr} were constant for the calculations of human body exergy balance for burn patient, and were changeable for the visitor and healthcare worker. T_{cl} was calculated on the basis of experimental conditions. Conventional system consists of three oil–filled electric heaters type Heller (230 V – 50 Hz, 2000 W) and a split system with indoor unit for cooling.

A ward for severe burn injuries should have temperature controls that permit adjusting the room temperature up to 32 °C and relative humidity up to 95% (ASHRAE, 2007). T_{ai} and RH_{ai} should be maintained at 30–33 °C and 80%, respectively, in order to decrease energy demands and evaporative heat losses (Herndon, 1996; Wilmore, et al., 1975). Regulations and recommendations for hospital environment define requirements for T_{ai} and RH_{in} that are useful for the room equipped with the conventional system. For the room with the innovative control system, other requirements that include mean radiant temperature T_{mr}, T_{ai} and parameters connected with the individual user have to be defined. For this purpose, T_o was introduced, which presents the required condition in the room with the innovative system (T_o=32 °C, RH_{in}=80 %) (Dovjak, 2012).

The required conditions were created with both systems. Individual thermal comfort conditions were analysed using the calculated human body exergy balance (hbExB), human body exergy consumption (hBExC) rate and predicted mean votes (PMV) index with spread sheet software developed by Hideo Asada Rev 2010 (Iwamatsu and Asada, 2009; Shukuya et al., 2012; Shukuya, 2013). The human body exergy model by Shukuya et al. (2012) was used for calculation.

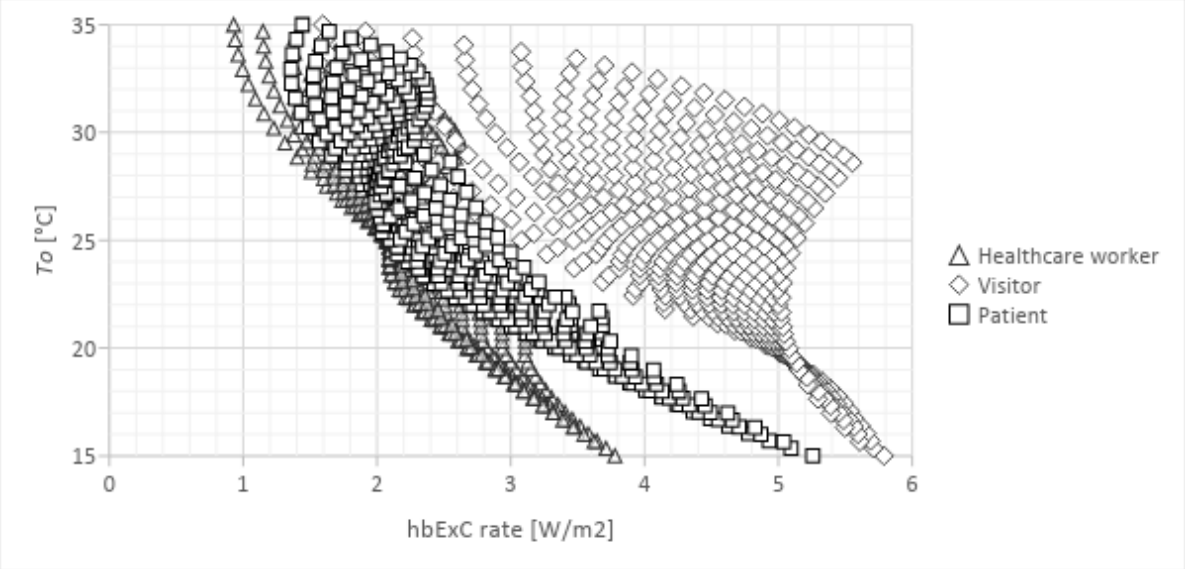
Results

How a subject produces and emits the heat in different environmental conditions is precisely evaluated with human body exergy balance analysis. The general form of exergy balance equation for a human body as a system is shown in Eq. (1) (Shukuya, 2013):

[Exergy input]–[Exergy consumption]=[Exergy stored]+[Exergy output] (1)

The exergy input consists of five components: 1) warm exergy generated by metabolism; 2) warm/cool and wet/dry exergies of the inhaled humid air; 3) warm and wet exergies of the

liquid water generated in the core by metabolism; 4) warm/cool and wet/dry exergies of the sum of liquid water generated in the shell by metabolism and dry air to let the liquid water disperse; 5) warm/cool radiant exergy absorbed by the whole skin and clothing surfaces. The exergy output consists of four components: 1) warm and wet exergy contained in the exhaled humid air; 2) warm/cool and wet/dry exergy contained in the resultant humid air containing the evaporated sweat; 3) warm/cool radiant exergy discharged from the whole skin and clothing surfaces; and 4) warm/cool exergy transferred by convection from the whole skin and clothing surfaces into surrounding air (Shukuya, 2013).



Picture 1: Human body exergy consumption (hbExC) rate [W/m^2] as a function of operative temperature (T_o) in conditions created with innovative control system (80 % RH_{in}). Marked line presents the required T_o 32 °C.

To maintain thermally comfortable conditions, it is important that the exergy consumption and stored exergy are at optimal values with a controlled combination of exergy input and exergy output (Shukuya 2013; Dovjak, 2012). In general, lower human body exergy consumption rate results in thermally comfortable conditions (at thermal neutrality, PMV=0). Human body exergy consumption rate means the rate of exergy that is consumed only by the process of thermoregulation. Picture 1 presents the hbExC rate as a function of T_o in the room with the innovative control system (RH_{in}=80 %) for three individual users. The required T_o 32 °C (marked with line) can be attained with a set of combinations between T_{ai} and T_{mr}, i.e. T_{ai} 35 °C and T_{mr} 31 °C; T_{ai} 26 °C and T_{mr} 35 °C, etc. These combinations result in different hbExC rates (from 1.4 W/m^2 to 2.4 W/m^2 for burn patient; from 1.0 W/m^2 to 2.3 W/m^2 for healthcare worker; from 1.7 W/m^2 to 4.4 W/m^2 for visitor), and also in different hbExB-exergy inputs and exergy outputs, as presented in Table 1.

Table 1. Human body exergy balances for three individual users exposed to conditions created with the innovative control system. Calculated values of exergy inputs, outputs, hbExC and stored exergy are presented as rates [W/m^2] (Dovjak, 2012; Dovjak, et al., 2014)

Subject	$T_{set\ up}$[a]	From inner part	C/W[b] rad exergy in	C/W[b] conv exergy in	Breath air in	Stored exergy	C/W[b] rad out	C/W[b] conv out	Exhal sweat out	HbExC
Burn patient	T_{ai}=26°C T_{mr}=35°C	4.36	C=0 W=0.64	0	0	0.006	C=0 W=0.67	C=0 W=1.80	0.16	2.37
	T_{ai}=35°C T_{mr}=31°C	1.30	C=0.07 W=0	0	0	0.001	C=0 W=0.01	C=0 W=0.03	0.02	1.36
Health care worker	T_{ai}=26°C T_{mr}=35°C	2.83	C=0 W=0.64	0	0	0.004	C=0 W=0.43	C=0 W=0.65	0.09	2.30
	T_{ai}=35°C T_{mr}=31°C	0.95	C=0.13 W=0	0	0	0.04	C=0.001 W=0	C=0.001 W=0	0.01	1.03
Visitor	T_{ai}=26°C T_{mr}=35°C	5.24	C=0 W=0.64	0	0	0.02	C=0 W=0.35	C=0 W=0.95	0.17	4.40
	T_{ai}=35°C T_{mr}=31°C	1.90	C=0.13 W=0	0	0	0.28	C=0 W=0.0001	C=0 W=0.0001	0.02	1.72

[a]$T_{set\ up}$–set up temperature; T_{ai} –room air temperature; T_{mr}–mean radiant temperature. [b]C/W–cool/warm exergy.

Exergy inputs and outputs of the hbExB for burn patient, healthcare worker and visitor can be regulated by setting $T_{set\ up}$ (set up temperature; set of combinations between T_{ai} and T_{mr}) of innovative control system. In such a way, optimal hbExB can be attained, resulting in optimal conditions for health care and treatment of burn patient as well as thermal comfortable conditions for healthcare worker and visitor. This approach offers new possibilities of active regulation of the hbExC rates, as well as separate parts of hbExB. For burn patient conditions, which result in minimal hbExC rate valid for thermoregulation, not only minimal possible metabolic thermal exergy rate, but also radiation, convection and evaporation (healing oriented conditions) are achieved by innovative system ($T_{set\ up}$:35 °C T_{ai}, 31 °C T_{mr}, 80%). For visitor and healthcare worker thermally comfortable conditions with minimal hbExCr and PMV=0 are attained by innovative system as well ($T_{set\ up}$ for visitor: 17 °C T_{ai} and 25 °C T_{mr}, $T_{set\ up}$ for healthcare worker: 18 °C T_{ai} and 27 °C T_{mr}; 60% RH_{ai}).

In the room with the conventional system, the required conditions are T_{ai}=T_{mr}=32 °C and RH_{in}=80% (Table 2). Contrary to innovative system, in the case of conventional system, T_o is equal to T_{mr} and T_{ai} (32 °C), and cannot be regulated. The condition T_o=T_{ai}=T_{mr}=32 °C results in only one hbExB (exergy inputs and outputs) and cannot be regulated according to the individual user's needs and demands (Table 2).

Table 2. Human body exergy balances for three individual users exposed to conditions created with the conventional system. Calculated values of exergy inputs, outputs, hbExC and stored exergy are presented as rates [W/m^2] (Dovjak, 2012; Dovjak, et al., 2014)

Subject	$T_{set\ up}$[a]	From inner part	C/W[b] rad exergy in	C/W[b] conv exergy in	Breath air in	Stored exergy	C/W[b] rad out	C/W[b] conv out	Exhal sweat out	HbExC
Burn patient	T_{ai}=32°C T_{mr}=32°C	2.29	C=0 W=0	0	0	0.006	C=0 W=0.12	C=0 W=0.32	0.05	1.79
Health care worker	T_{ai}=32°C T_{mr}=32°C	1.63	C=0 W=0	0	0	0.003	C=0 W=0.03	C=0 W=0.04	0.03	1.53
Visitor	T_{ai}=32°C T_{mr}=32°C	3.05	C=0 W=0	0	0	0.18	C=0 W=0.04	C=0 W=0.09	0.05	2.68

[a]$T_{set\ up}$–set up temperature; T_{ai}–room air temperature; T_{mr}–mean radiant temperature. [b]C/W–cool/warm exergy.

Discussion

For burn patient, it is important to create conditions, which result in minimal hbExC rate valid for thermoregulation, along with minimal possible metabolic thermal exergy rate, radiation, convection and evaporation (healing oriented conditions). The same conclusions were drawn by Herndon and Tompkins (2004), Kelemen et al. (1996), Marin et al. (1992), Wallace et al. (1994). The required conditions for burn patient room do not present thermally comfortable conditions for healthcare worker and visitor. The innovative control system could provide special zones for individual user. For healthcare worker and visitor individual comfort zones equal to thermal neutrality can be assured (PMV=0) with minimal possible hbExC rate and optimal combination of exergy inputs and outputs, while for burn patient special zone with required conditions, which have influence on healthcare and treatment, can be created separately. A new possibility of active regulation of the hbExC rate, hbExB and thermal comfort conditions with the innovative system is proposed and presented in more detail by Dovjak (2012), Dovjak et al. (2013) and Dovjak et al. (2014). It is possible to introduce several different technologies and systems inside such space. They can be harmonically adjusted to the hospital specifics. The study presents a novel approach towards the design of complex hospital environment. The design of built environment, which places the individual user of space at the forefront, results in healthy, comfortable and stimulating conditions with minimal possible use of energy for its operation. Dovjak (2012) highlighted that such approach leads to significant energy savings, even up to 27 % for heating and up to 73 % for cooling purposes. Better indoor climate as well as reduced energy consumption have also been proven by other studies. Van Osta et al. (2017) compared two hospitals with different organization and control of indoor environment, i.e. multi-bedded wards, where air was conditioned with an all-air system and single patient rooms with floor heating, and cooled with concrete core activation and natural ventilation. The findings showed that single patient rooms with user control of indoor environment based on patient's personal preferences (opening windrows, control of temperatures) result in better indoor climate as well as reduced energy consumption. A limitation of the current study is that the response of human body on environmental conditions was calculated and not measured.

Conclusion

Based on the exploration of properties of conventional and innovative control systems, the following conclusions can be drawn: The innovative control system of microclimate conditions enables the creation of optimal conditions for burn patient and thermal comfort conditions for health care worker and visitor. The regulation of separate parts of human body exergy balance is possible by setting the innovative control system, which the conventional system cannot assure. The present study can be considered as an initial step towards individualization of personal space in indoor built environments.

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VIRTUAL REALITY IN HEALTHCARE: LITERATURE REVIEW WITH BIBLIOGRAPHIC COUPLING ANALYSIS

VIRTUALNA RESNIČNOST V ZDRAVSTVU: PREGLED LITERATURE Z ANALIZO BIBLIOGRAFSKEGA PARČENJA

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Abstract

Introduction: *With the development of technology, virtual reality (VR) is becoming an important method of presenting content that can be widely utilized in healthcare. With higher accessibility and quality improvement, relevant fields of virtual reality usage in healthcare should be identified for future research and implementation.*

Methods: *A literature review using Web of Science search engine was performed, which included 525 units of literature. Bibliographic coupling analysis using software VOSviewer software was performed to objectively determine most relevant fields. Further content analysis of included articles was carried out manually for clearer depiction of review results.*

Results: *102 bibliographically connected articles were divided into 9 clusters that represent current research fronts of virtual reality use in healthcare. In secondary analysis, 11 fields emerged that were systematically arranged for better representation.*

Discussion: *The article does not include all fields of virtual reality usage in healthcare and does not determine how successful implementations in various fields are, but rather presents a comprehensive overview of a broad topic. This review has detected virtual reality technology in healthcare as a means of treatment and rehabilitation, healthcare professional education and training, pain and stress management and as a means of research and disease assessment.*

Keywords: *patient, rehabilitation, research, computer simulations*

Izvleček

Uvod: *Z razvojem tehnologije postaja, kot način prikazovanja vsebin na priljubljenosti pridobiva tudi virtualna resničnost. Pristop lahko na različne načine vključujemo tudi v zdravstvu, zato je smiselno poiskati najbolj pomembna področja uporabe virtualne resničnosti v zdravstvu, za nadaljnjo raziskovanje in vključevanje v klinično okolje.*

Metode: *Izveden je bil pregled literature s pomočjo iskalnika Web of Science, ki je zajemal 525 enot literature. Z metodo bibliografskega parčenja s programsko opremo VOSviewer, smo lahko objektivno izpostavili najbolj relevantna področja uporabe, nadaljnja vsebinska analiza pa je bila izvedena ročno.*

Rezultati: *102 bibliografsko povezanih enot je bilo razdeljenih v 9 skupkov, ki predstavljajo 9 najbolj aktualnih področji uporabe virtualne resničnosi v zdravstvu. V sekundarni analizi smo ročno tvorili 11 skupkov, ki so sistematično predstavljeni za boljšo reprezentacijo področji uporabe.*
Razprava: *Članek ne zajema vseh področji uporabe virtualne resničnosti v zdravstvu in niti ne podaja sodb o uspešnosti tehnologije na posameznih področjih ampak z veliko mero objektivnosti predstavlja široko tematiko. Pregled literature prepoznava virtualno resničnost v zdravstvu kot sredstvo zdravljenja in rehabilitacije, izobraževanja in urjenja zdravstvenih delavcev, obvladovanja bolečine in stresa in kot sredstvo raziskovanja in ocenjevanja parametrov bolezni.*

Ključne besede: *pacient, rehabilitacija, raziskovanje, računalniške simulacije*

Introduction

The importance of information communication technologies in healthcare is on the rise. The state-of-the-art devices enable us not only to communicate and manage data more efficiently, but also to create and interact within virtual worlds. Although virtual reality (VR) is often understood as a uniformed concept, a bundle of similar but different methods of presenting content are often branded as VR (Augment, 2016).

The primary goal of VR for the user is to create the illusion of being inside the virtual environment, with VR headsets or glasses (e.g. "Oculus rift", "HTC Vive") gaining popularity (Grossman, 2016). Augmented reality, on the other hand, is not based in virtual world but enriches reality with virtual elements or information with emphasis on utility (e.g. Google glass™ and recently released mobile app Pokemon Go) (Boulos, et al., 2017). Mixed reality is very similar, since it also enriches reality with virtual elements, but tries to integrate them to give the illusion that virtual elements are in fact real (Augment, 2016). Mobile app "Pokemon Go'' aims to achieve this effect, but is closer to augmented reality because of poor virtual element integration (Johnson, 2016).

Different methods are often included under the umbrella term VR, but most current applications do in fact rely on this concept. The concept itself can be considered old, dating back to virtual worlds by Leipnitz in 1673. Although his ideas were never realized, his description closely resembles modern technology enabled experience (Steinhart, 1997). The fFirst attempt of VR in practice was documented in 1883, but is considered more art than technology. The Gettysburg's ciklorama is an artwork, which completely surrounds the spectators, making them feel like part of the battle of Gettysburg (Grossman, 2016). The first technology based VR was created for flight simulations in 1982, giving way to using the concept in high risk tasks training. Technology understood as VR today has been in use since 1989, when handheld device BOOM with two small screens was developed for commercial use (Novák-Marcinčin, 2010). In 1990, DataGlowe was designed, enabling the users to interact with virtual environments (Boulos, et al., 2017).

One of the important qualities of VR systems is the level of immersion a system can provide. Devices can convince users into trusting the reality of the virtual world to a variable extent. Progress in the field tends to lean toward ensuring greater immersion levels, with VR headsets being currently most successful (Sorokanich, 2016).In healthcare, however, the level of immersion is not as important as in commercial use. There is more focus on assuring that the accuracy of real interactions is adequately represented in VR. That is why different systems are currently in use to provide different levels of immersion according to health-related needs, which can be divided into 3 groups.

Head-based systems like VR glasses or VR headsets are currently gaining popularity. They assure high immersion level and are usually used in conjunction with a different device as headsets only serve as projecting content (Davis, 2009).

Projection-based systems are even more immersive in comparison, but require a room to project large images. CAVE system was presented in 1992, whicht was supposed to ensure adequate quality of projected images (Novák-Marcinčin, 2010). At the moment, projection based systems are unpopular due to large costs, practicality and development of small, affordable and improving headsets. Monitor-based systems, commonly used in modern life and healthcare, are least immersive. A monitor is usually connected to a controller offering virtual world interactions (Davis, 2009). Systems are most widely used to support gaming, but play an important role in healthcare with software designed for healthcare professional training (Karnjuš, et al., 2012), or combined with sophisticated controllers to accurately transfer patients' movements.

With technological development, a rise in quality and drop in cost are to be expected. Main research fronts involving VR technology should be identified for future research and possible implementation.

Methods

A literature review with Web of Science search engine was performed on recent literature, using "virtual reality", "VR", "healthcare", "health", "medicine", "patient", "treatment" and "nursing" as search terms. The results were modified to exclude areas not related to healthcare (computer science, engineering industrial, software engineering, etc.) and to include only freely available articles published between 2007 – 2017. Final search yielded 525 units of literature, citations being exported in .txt file for further analysis.

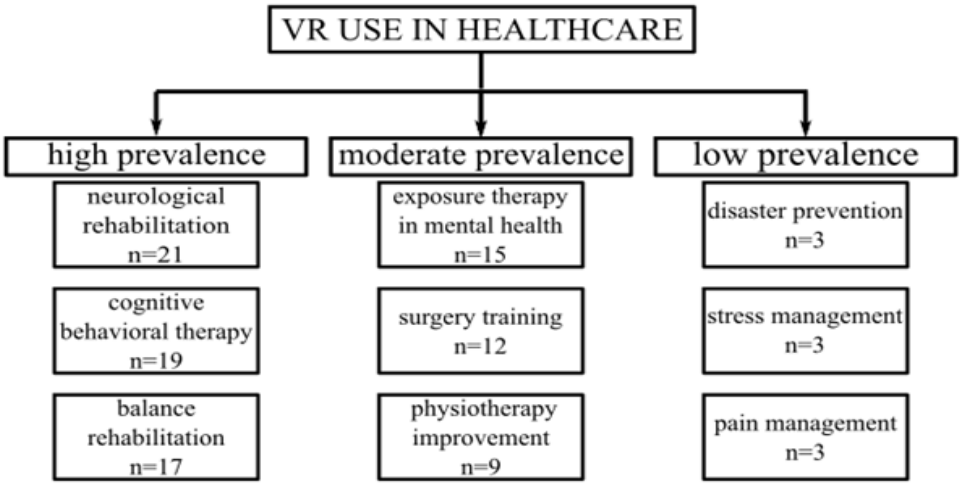
Bibliographic coupling was performed on the exported file using VOSviewer. The number of matching citations was tailored to 8 to include a manageable number of units. Final analysis was performed using 108 units of literature that were divided into 9 clusters according to bibliographic similarity, not including 6 units that showed no bibliographic connection to the rest. Each individual cluster was then evaluated and identified as a research front.

Although clusters were formed using VOSviewer, some units were later manually appointed to correct clusters according to their content and one irrelevant unit was removed. Secondary analysis revealed that it is necessary to form new clusters to adequately represent current

research fronts. Final depiction of research fronts includes 10 fields of use and research of VR in healthcare.

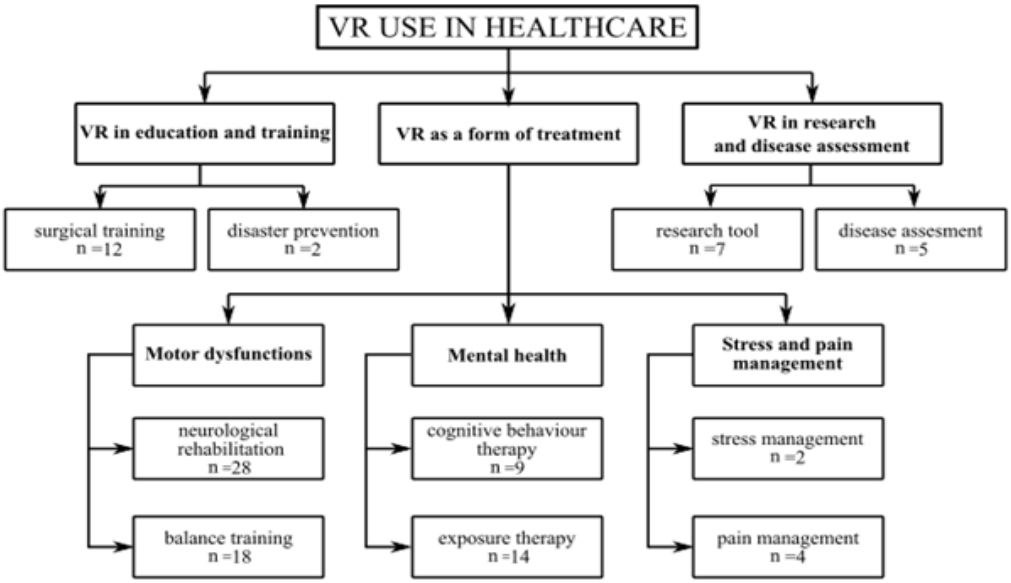
Results

VOSviewer analysis detected 9 current research fronts, emerging out of 103 units of included literature. Clusters are shown in Picture 1 and are arranged in groups of high, moderate and low prevalence clusters according to the number of units included in particular cluster.



Picture 1. Presentation of cluster detected by VOSviewer (n = number of units in cluster)

After title and abstract screening, some articles were moved to a better fitting cluster. The articles that did not properly fit into any of the existing clusters were bundled to create new clusters according to their content. A logical schematic was formed to present research fields more systematically, since different fronts are content related. Findings with additional research fronts are presented in Picture 2.



Picture 2: Systematic presentation of detected research fronts (n = number of units in cluster)

VR as a form of treatment

VR is most prominent in the field of motor rehabilitation as part of neurological conditions. The highest number of articles were dedicated to stroke rehabilitation (Cikajlo, et al., 2012; van Dokkum, et al., 2012; Turolla, et al., 2013), following non-condition specific balance rehabilitation (Gutiérrez, et al., 2013; Kim, et al., 2013), Parkinson's disease (Gilat, et al., 2013) and fall prevention (Duque, et al., 2013; Mirelman, et al., 2013). The described VR technology was usually modified according to a specific task or gesture or depending on the type of required rehabilitation (upper extremities, gait, balance training, fine motor skills). Level of immersion is secondary since monitor-based systems are the norm. Controllers,on the other hand, are far more sophisticated and modified (Zimmerli, et al., 2013). Differently shaped hand-held controllers are used to track movement in gesture training (van Dokkum, et al., 2012; Turolla, et al., 2013), and tilt-boards (Cho, et al., 2012) or treadmills (Cikajlo, et al., 2012) in walking and balance rehabilitation. Much attention is also given to precision of movement tracking, since mild differences in patient's movement should be detected. Systems include safety mechanisms to prevent falls (Cikajlo, et al., 2012; Mirelman, et al., 2013), or mechanisms to robotically enhance the patient's movement in cases of more severe motor dysfunctions (Cameirao, et al., 2012; Steinisch, et al., 2013).

These systems are usually heavily modified.They serve only one purpose and are expensive. However, commercial devices can also be used in healthcare, such as Kinect™ technology (Xbox 360™) (Gutiérrez, et al., 2013; Lloréns, et al., 2015) and Nintendo Wii-like consoles (Cho, et al., 2012; Standen, et al., 2017), which are widely accessible and easier to implement in a patient's home environment. Taking into consideration the duration of rehabilitation after some conditions and the cost of institutional care, this approach might become more widespread in the future (Cho, et al., 2012; Cikajlo, et al., 2012; Standen, et al., 2017).

VR is also used in mental health treatment, with applicability in several conditions. The highest number of articles described phobia treatment, where VR is used in exposure therapy (McLay, et al., 2012; Botella, et al., 2014; Shiban, et al., 2015). In this case, VR exposes patients to the object or context of their fear, but in a controlled and safe environment. VR exposure only could never be as effective as traditional methods (Meyerbroeker, et al., 2013), so other advantages of this approach are highlighted. During sessions, the patient is in a safe environment, while a healthcare professional has complete control over the simulation, monitoring the patient's reactions or even use medications during exposure (Meyerbroeker, et al., 2012). In our review, the use of VR was detected in exposure therapy for fear of flying (Meyerbroeker, et al., 2012; Botella, et al., 2014), fear of spiders (Shiban, et al., 2015), agoraphobia (Malbos, et al., 2013) and post-traumatic stress disorder (McLay, et al., 2012)

VR technology can also be used to enhance cognitive behavioural therapy, where VR simulations consist of patient tailored simulations that present stress or discomfort. It should be noted that VR can not be used independently but as a tool of presenting the scenario. The focus remains on therapist's interventions via constant contact with the patient, giving directions and advice (Safir, et al., 2012). An example of this approach is cognitive behavioural therapy for smoking cessation, where a patient participates in a simulation of a party with

smokers while the therapist communicates with the patient, points out possible triggers or exit strategies (Bordnick, et al., 2011). VR applicability was detected for enhancing cognitive behavioural therapy in nicotine dependence (Bordnick, et al., 2011), eating disorders (Marco, et al., 2013), schizophrenia (Rus-Calafell, et al., 2014) and autism (Kandalaft, et al., 2013).

Our review also detected VR as a method of stress and pain management. Relaxing simulations with soothing music or sounds can be used to decrease current levels of stress (Villani, et al., 2012; Gao, et al., 2014), or stress can be actively managed involving a therapist providing advice and coping strategies (Annerstedt, et al., 2013). The approach is expected to gain popularity on the account of simplicity of use and VR headsets commercialization. Pain management using VR can also be divided into two areas: use of VR as a distraction for acute pain during wound dressing or medical interventions (Malloy, et al., 2010; Guo, et al., 2015), or VR in chronic pain management (Jones, et al., 2016). The main benefits of this approach are cost efficiency and less frequent pharmacological interventions.

VR in research and disease assessment

This cluster was manually created since bibliographic coupling arranged articles according to conditions they described rather than methodology or aims. We believe that this field should be pointed out since VR use can enable new and innovative ways of disease assessment and research.

Complex VR systems are highly sensitive in patient movement detection. Data regarding hand movement (Arias, et al., 2012) or gait patterns (Gilat et al., 2013; Matar et al., 201) can be used to better understand Parkinson's disease or serve as symptoms assessment tool in treatment. Tilt-boards can be used to improve balance (Cho, et al., 2012), or to determine causes for lack of balance in seniors (Ferrari, et al., 2014). Systems primarily used in treatment or rehabilitation can therefore be used in research and disease assessment.

Similar to movement tracking in motor dysfunction conditions, cognitive functions can also be investigated. Our review discovered research of cognitive function in schizophrenia (Fajnerová, et al., 2014), epilepsy (Grewe, et al., 2014) and Alzheimer's disease (Plancher, et al., 2012). VR technology was used to research memory functions or spatial orientation. Simulations of labyrinths (Spieker, et al., 2012) or cities (Plancher, et al., 2012) were used to research spatial orientation, and a virtual store with different items to memorize was used for memory assessment and training (Grewe, et al., 2014). In comparison to motor functions, cognitive differences are harder to detect. Here, the main benefit of VR is ensuring the reproductions of identical simulations to adequately compare experimental to control group.

VR in education and training

Dating back to 4th century, cadavers were used to practice medical procedures. However, lack of physiological responses was evident. Artificial simulators like Resusci-Anne for reanimation training in 1950 and an anesthesia simulator mimicking a functioning cardiorespiratory system in 1960 were developed to more accurately mimic actual human responses (Rehder, et al., 2016). Since then, VR simulators have become more common, with

the development most evident in the field of flight and surgery simulations. With the development of medicine and surgical procedures, simulators have become vital for training healthcare professionals, since tasks became more sophisticated and carried higher risks (Schirmer, et al., 2013).

Most articles in this review focused on surgery procedures VR simulators, such as neurosurgery (Alaraj, et al., 2013; Yudkowsky, et al., 2013), maxillofacial surgery (Wang, et al., 2012), otorhinolaryngology (Arora, et al., 2011), and arthroscopic (Cannon, et al., 2014), laparoscopic and endoscopic (Våpenstad, et al., 2013) surgical techniques. New technology focuses not only on creating simulations but also to combining patient's data and images to accurately represent anatomical structures. This enables us to combine the physiological responses of artificial simulators with precise anatomic structures previously only reached with cadavers (Arora, et al., 2014; Ryan, et al., 2016).

We also noted some use of VR for education in other fields. Two studies depicting use of VR simulators in disaster training (Chen, et al., 2012; Farra, et al., 2013) were detected and one meta-analysis on combined applications of computer games, simulations and VR use in the broader field of education (Merchant, et al., 2014), that was manually removed from analysis.

Discussion

Two studies that presented this broad topic similar to this article were detected additionally (Riva, 2003; Pensieri, et al., 2014). Recent literature review from 2014 by Pensieri and Pennacchini (2014), used "Virtual Reality" and some additional search terms in four different search engines. Review noted an increase in number of found articles in repeated searchers for all terms illustrating a growing interest of VR application in healthcare. Results of the meta-review were divided into 4 areas according to a previous 2003 review by Riva (2003) including: firstly, communication interface (presence and avatar secondly, medical educational training) thirdly, surgical simulation (neurosurgery, laparoscopic and endoscopic simulators, other) and fourthly, therapy (phobias, posttraumatic stress disorder and anxiety disorder, rehabilitation and pain management).

Our review proves to be broad and includes areas which are not limited to specific healthcare profession only. Apart from using VR as a communication interface, our review adequately corresponds with previous depiction of this broad field, which to certain degree, confirms the accuracy of our approach. The main contribution of this review is the addition of two research fronts previously not highlighted: stress relief and management, primarily included by bibliographic coupling and manually constructed VR as a research and disease assessment instrument. Although the cluster was manually constructed, it is important to differentiate the use of VR technology as a form of therapy or as a research instrument. VR supported research methodology could be considered important in the near future, since it ensures the creation of controlled environment with less confounding variables and possibilities of more accurate data gathering based in patient safe environment.

Conclusion

The article does not include all research fields which are relevant for VR in healthcare. It also does not determine the success rate of methods presented and further analysis should be made in particular fields of interest. This article provides a depiction of currently most important research fronts, with high methodological objectivity for future research and implementation.

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PATIENT EMPOWERMENT WITH MHEALTH APPS

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Abstract

Introduction: *Our way of communicating and interacting between people has changed by using smartphones. Flows of information travel much faster. Today, people are always and everywhere accessible. Smartphones make it possible to use a variety of apps in caring for our health. Thus, in addition to the technological advance, this constant flow of information altered the dynamics by which the users regulated their state of health and illness, as well as related to professionals and health organizations. Promotion and emphasis on the patient's active role and the mutual relationship between the patient and the healthcare personnel are changing. An integrated health care model strives to empower the patient, so as to influence his/her treatment and, consequently, gain greater control over his/her own life. The paper examines the extent to which health-related mobile applications affect patient empowerment and how empowerment is promoted. Particular attention is given to the review of articles that analysed possible empowering factors that affect patients in a positive and negative manner.*

Methods: *An integrative literature review was conducted, searching the databases in MEDLINE, CINAHL with full text and ScienceDirect. We used the following terms: "mobile applications", apps, mapps, smartphone, mhealth, patient, health, evaluation, effect, impact, "assess concern". We limited the search to the publication period 2012-2017. Selection of the*

articles was based on predetermined inclusion and exclusion criteria, following the search protocol.
Results: *In regard to the patient's use of mHealth apps, nine critical areas, affecting the patient's empowerment, were identified: patient motivation; level of patient empowerment, engagement and activation; amount of information; level of knowledge and health literacy; communication and relationship; patient safety and privacy; general usefulness of mHealth apps; evidence-based approach and follow-up of usage mHealth apps and individualised/personalized approach to patients.*
Discussion: *This literature review evidences a lack of research that confirms or opposes the usefulness of mHealth apps. It is concerning that their number is increasing in spite the scarcity of evidence of their effectiveness. Additionally, the concept of patient empowerment needs a thorough clarification and elaboration of guidelines to answer the key question: Which criteria, elements or tools can be used to prove that our patient is empowered? In the future, evidence-based mHealth apps are required. Involvement of healthcare personnel and patients in all stages of mHealth apps development is essential to achieve the desired health or wellbeing outcome or/and the patient empowerment. Nurses play an important role in this process as promoters and facilitators and their role will become even more significant in this field in the future. To become future-proof, nursing students should possess good digital literacy skills and should be familiar with the use and potential impact of mHealth apps usage. Therefore, nurses should also possess the knowledge on how to monitor the benefits of using mHealth apps.*

Keywords: *healthcare, mobile applications, nursing*

Izvleček

Uvod: *Naš način komunikacije in interakcije med ljudmi se je spremenil zaradi pametnih telefonov. Dostop do informacij je vedno hitrejši in vedno dosegljiv. Predvsem pa nam pametni telefoni omogočajo uporabo različnih brezplačnih aplikacij v povezavi s skrbjo za naše zdravje. Te aplikacije so namenjene vsem in ne samo zaposlenim v zdravstvu. Zanimalo nas je kako mobilne aplikacije v povezavi z zdravjem, vplivajo na uporabnike aplikacije ter kakšne so koristi ter slabosti uporabe mobilnih aplikacij, ki so povezane z zdravjem ljudi.*
Metode: *Po sistematičnem pregledu literature smo uporabili deskriptivno metodo dela, ki temelji na kritičnem branju strokovne in znanstvene literature v slovenskem in tujem jeziku. Za iskanje literature smo uporabili portal digitalne knjižnice Univerze v Ljubljani s pomočjo elektronske podatkovne baze Web of Science in Scopus.*
Rezultati: *V članku so predstavljene najpogostejše verzije mobilnih aplikacij v povezavi s skrbjo za zdravje. Ugotovitve pregleda literature so predstavljene s prikazom tako negativnega kot pozitivnega vpliva mobilnih aplikacij za uporabnike.*
Razprava: *Vedno več mobilnih aplikacij ponuja spremljanje uporabnikovih navad (spanje, telesna aktivnost, prehranski dnevniki, ...) in navodila za zdrav življenjski slog. Uporabniki mobilnih aplikacij imajo tako možnost prevzeti aktivno vlogo v skrbi za svoje zdravje. Z zdravjem povezane mobilne aplikacije imajo lahko pomembno (novo) vlogo pri učenju zdravega življenjskega sloga ter pri spodbujanju ohranjanja zdravih navad zdravih posameznikov in tudi pri skrbi za zdravje že obolelih ljudi.*

Ključne besede*: mobile application, usability of mobile health care application, health care*

Introduction

Smartphones are becoming personal computers of the contemporary person, which have not only transformed interpersonal and professional communication and accessibility, but can monitor human movement, well-being and vital functions with various sensors and wearable devices. The smartphone revolution is offering an unprecedented opportunity to provide better health and wellbeing support when and where needed by the patients. In compliance with behavioural theories, smartphones can play a central role in the change of patients' unhealthy life-styles. However, the acceptance of this revolution and the health professionals' profound knowledge in this area are important elements in its integration and successful health education and health promotion.

Mobile Health (mHealth) is an area of electronic health (eHealth), which provides health services and information via mobile technologies such as mobile phones and Personal Digital Assistants (World Health Organization, 2011). According to the Research2Guidance team (2017), mHealth applications (apps) market began to develop 10 years ago and its development has been incredibly quick and unpredictable. By 2017, 325,000 mHealth apps were available in the international market, with 78,000 mHealth apps added in 2017. Android, as the leading mHealth platform, is overtaking the market from iOS (Research2Guidance, 2017). In this respect, mHealth apps can help patients manage their own health and wellness, promote healthy living, and gain access to useful information when and where they need it. In case mHealth apps are defined as medical devices, Food and Drug Administration (2016), try to regulate the market of medical apps with nonbinding recommendations.

The World Health Organization (2011) estimated that mHealth can revolutionise health and well-being outcomes if implemented strategically and systematically. Thereby we could provide virtually every smartphone owner with health and well-being individualised expertise and knowledge in real-time (Hopia, et al., 2015). Intervention should be designed to motivate patients to change their behaviour, enabling the individual (1) to believe the decision to enact a behaviour is self-regulated (autonomy); (2) to believe that the patient is able to maintain the change (competence); and (3) to believe that the patient's decision to change is supported by those whose opinion they value (relatedness). The interactive design and personal nature of the mHealth app may support patient autonomy and competence (Ledford, et al., 2017).

Moreover, mHealth apps developers often set the goal of empowering the patient with different apps. Empowerment is a core process and an outcome of patient-centred care that promotes patient engagement and has a positive impact on health and wellbeing. Empowerment reflects the ability of patients to understand their health status in order to actively and positively affect their health. It is a social, cultural, psychological or political process through which patients/groups are able to express their needs, present their concerns, devise strategies for involvement in decision-making, and achieve political, social and cultural actions to meet those needs (World Health Organization, 1998). Patients are empowered when they have the knowledge, skills, attitudes, and self-awareness necessary to influence their own behaviour and that of others to improve the quality of their lives (Roberts, 1999). Patients with chronic diseases are in increased need for preventive activities, for empowerment, for decision-making

and for self-care and self-management. Caring for yourself, seeking for better health outcomes and tips for wellbeing, and how you can help yourself during illness is as old as humanity. Since its inception, humanity has developed a system of measures to strengthen the health and a variety of different support in disease (McCormack, 2003).

Levin was one of the first researchers who defined the process of self-care. He defined it as a process in which a layperson works on his behalf in the field of health promotion, disease detection, prevention and treatment. He defines it as an integral part of the healthcare system, the system would have had a much more difficult task without it (Levin, 1976). Knowing the elements of patient's self-care process provides health professionals with a professional practice framework of when they can positively influence the patient's health (Høy, Wagner and Hall, 2007), as well as the health of the whole family. Effective self-care of patients with chronic disease has a significant impact on reducing the frequency and length of hospitalizations, lower costs of healthcare and decrease mortality rates (Riegel, Jaarsma and Strömberg, 2012), leading to better treatment outcomes and quality of life.

The goal of this paper is to identify central topics in the literature related to patient empowerment when using mHealth apps. We aim to identify elements related to mHealth apps usage that strive for patient empowerment and self-care, analysing potential gaps that negatively influence the patients' experience and outcomes.

Methods

For the purposes of the study, an integrative literature review was conducted. The following databases were systematically searched: MEDLINE, ScienceDirect and CINAHL. These searches were limited to the literature with available full text published in English, between 2013 and 2017. Two researchers independently applied the same inclusion and exclusion criteria to select publications for analysis. The search of abstracts in selected databases was performed by using key words: ("mobile application" OR apps OR mapps OR smartphone OR mhealth) AND (patient OR health) AND (evaluation OR effect OR impact OR assess OR concern). The search was performed on December 15th, 2017.

After using the keywords, 679 hits were found in the following databases: ScienceDirect (n=280), MEDLINE (n=242) and in CINAHL (n=157 articles). Duplicates were eliminated (n=584). The remaining 95 relevant articles were the subject of comprehensive analysis and extraction of relevant data.

Results

Inclusion criteria were: accessibility to articles with full text, relevance to the topic under discussion and published in English. According to exclusion criteria, the articles focusing on the functionality of mHealth apps or articles with a description of research that represented only effectiveness in a narrow area without a broader perception of the impact on patient health. The review was carried out on 16 articles based on inclusion and exclusion criteria. The selected contributions were divided into groups according to the topics (Table 1).

Table 1. Results of literature review

Research themes:	**Authors**
Patient motivation	(Ledford, et al., 2017); (Carrera and Dalton, 2014).
Level of patient empowerment, engagement and activation	(Hopia, et al., 2015); (Singh, et al., 2016); (Sama, et al., 2014); (Risling, et al., 2017).
Amount of information	(Carrera and Dalton, 2014), (Kim, et al., 2017).
Level of knowledge and health literacy	(Bradway, Arsand and Grottland, 2015); (Kim, et al., 2017).
Communication and relationship	(Abelson et al., 2017); (Lupton and Jutel, 2015)
Patient safety and privacy	(Bradway, Arsand and Grottland, 2015); (Risling, et al., 2017); (Singh et al., 2016); (Kim, et al., 2017); (Bhuyan, et al., 2017).
General usefulness of apps	(Carrera and Dalton, 2014); (Singh, et al., 2016).
Evidence based approach and follow up of apps usage	(Carrera and Dalton, 2014); (Risling, et al., 2017); (Becker, et al., 2014); (Bradway, Arsand and Grottland, 2015); (Boudreaux, et al., 2014) (Rasche, et al., 2017).
Individualised/personalized approach to the patients	(Treisman, et al., 2016); (Feinberg, et al., 2017).

Patient motivation In a study with pregnant women using an mHealth app as a patient education and engagement tool, the authors found that patients' motivation and activation decreased during the process of using mHealth apps compared with mothers using a paper notebook (Ledford, et al., 2017). The potentially negative spiral of decreased patient activation and its potential negative effects on health outcomes should be identified. A more complex model is needed to explain motivations for engaging in concept do-it yourself, supported also by mHealth apps in healthcare (Carrera and Dalton, 2014).

Level of patient empowerment, engagement and activation Even in eHealth concepts there is persistent lack of clear definition of patient empowerment as a distinct conceptual entity and should not be used interchangeably with the terms, such as engagement and activation. It should be a subject of research within eHealth context (Risling, et al., 2017).

The level of patient engagement during the development of mHealth apps is not always accurate (Sama, et al., 2014). Hopia et al. (2015) argued that patients have ideas and views on how mobile services should be developed to meet their needs with better policies that include patients and provide them with the freedom of choice in evolving services. Patients have a desire to participate in the development of these devices. They also want to have an influence in decision-making concerning their healthcare. However, these processes and decisions often lie with practitioners who develop mHealth apps (Hopia, et al., 2015). The framework of patient engagement was conceptualized by experts (Singh, et al., 2016). Less active and poorly motivated patient could be supported by proper health education, reminders, and recording of health information. Sama et al. (2014) reported that self-monitoring was the most commonly

used method in engagement approach (in 74.8 %). In their study, a total of 83 out of 400 apps (20.8%) used two or more approaches, with self-monitoring and progress tracking being the most frequent combination.

Amount of information Providers are concerned about inaccurate or misleading information leading to unrealistic expectations. Providers also fear that information will challenge their authority, which can hinder the relationship between a professional and a patient (Carrera and Dalton, 2014).

In the case of specific health/developmental conditions (for example cancer disease), patients can be easily overwhelmed by the amount and complexity of health information related to the complex healthcare procedures and treatments, or they are too sick. When healthcare personnel use mHealth apps to provide care, they should take into account the patients´ level of health and digital literacy (Kim, et al., 2017).

Level of knowledge and health literacy Patients do not always have enough knowledge to efficiently interpret the collected data (self-monitoring). Application and mobile tools cannot replace practical training in disease self-management, clinical guidance or individualised health education (Bradway, Arsand and Grottland, 2015). Patients with insufficient knowledge about health and disease (e.g. cancer) are more likely to have a lower level of literacy. In addition to cancer patients' own health literacy, caregivers' health literacy plays a crucial role in caring for these patients. Limited health literacy among caregivers can have a negative impact on communication about patients' medical history, shared decision-making, and adherence to health care providers' recommendations. Health literacy could be improved by using mHealth apps, but it should be taken into account that not all patients have equal access to smartphones as well as equal knowledge regarding smartphone usage (Kim, et al., 2017).

Communication and relationship Some patients, especially women, may prefer face-to-face communication with healthcare providers (Abelson, et al., 2017). In this respect, mHealth apps developers, as part of their promotional efforts, also use specific methods regarding app interface and interactivity as engagement strategies. Self-diagnostic apps are changing the relationship between healthcare personnel and patients (Lupton and Jutel, 2015).

Patient safety and privacy When mHealth apps are recommended and used, a vital concern with patient privacy and confidentiality is raised as to who can and should ensure the safety of mHealth tools (Bradway, Arsand and Grottland, 2015; Risling, et al., 2017).

Evidence shows that the present system of healthcare data collection does not receive sufficient security support. Despite the presence of privacy policies in mHealth apps, people often do not read or comprehend them sufficiently and this can result in accepting vendor agreements without having the correct information or content (Kim, et al., 2017). Therefore, two aspects of safety should be considered, namely, the ability of an app to handle health information/data and the respect of patient information privacy and security (Singh et al., 2016). These concerns should be addressed during the policy-making and during developing and designing stages of mHealth apps (Kim, et al., 2017). These aspects need to be considered at every stage of design and development of mHealth apps (Bhuyan, et al., 2017).

General usefulness Who benefits from do-it yourself (mHealth) and how it contributes to health outcomes (Carrera and Dalton, 2014) is also an important subject when discussing and using mHealth apps. This notion if essential since not all patients are able to be involved in do-it yourself healthcare approach by using apps and eHealth/mHealth may not be the appropriate solution in all medical contexts or groups.

In a study conducted by Singh et al. (2016), the authors assessed possible usefulness of 946 iOS apps and 1,173 Android apps. The research revealed that just 143 (out of 2119) apps were considered useful. As every treatment and medical device, mHealth apps also need to be tailored to the patient's needs and prescribed/recommended with an understanding of its benefits and risks.

Evidence-based approach and follow-up of mHealth apps usage There is limited evidence on the impact of mHealth apps on better health and well-being outcomes. Availability of technology does not intrinsically alter disease states, nor can health information guarantee to promote health. It is necessary to expand the evidence-base behind do-it yourself approach, critically examining its impact across a wider range of tangible outcomes (Carrera and Dalton, 2014). Perceived positive effects of mHealth apps usage would not necessarily translate to overall improvements in patients' health outcomes. The ever-expanding presence of eHealth in the healthcare landscape must be factored into continuing patient empowerment study (Risling, et al., 2017). In this sense, mHealth interventions do not have sufficient evidence or significant scientific research (Bradway, Arsand and Grottland, 2015), which would allow a scale up beyond pilot studies. Systematic reviews on the topic found that while multiple studies have been conducted, many are of poor quality and very few have found clinically significant benefits of the interventions (Becker, et al., 2014). However, healthcare experts have to be sure about the positive effects of recommended mHealth apps on health outcomes (Boudreaux, et al., 2014).

Thus, further studies are needed to investigate which incentives could be facilitated to increase patient adherence to the recommended mHealth apps (Rasche, et al., 2017).

Individualised/personalized approach One mHealth app for diabetes or obesity cannot be suitable for all patients with that diagnose. Additionally, patients with mental health conditions deserve particular attention. For example, patients with schizophrenia who have cognitive deficits, face various fears and suspiciousness, such as suspicion of technology (or paranoid delusions concerning it) which can induce fear of computer-based devices at certain stages of psychosis. This group of patients also frequently manifests negative symptoms, including lack of energy and motivation. The described problems can have a considerable impact on the efficiency and usage of potential mobile application by patients with schizophrenia (ignoring messages, inconsistently responding or become tired of mobile engagement, etc.) (Treisman, et al., 2016). Future research should ensure that mHealth apps or interventions do not neglect patients with the highest heath risk factors (Feinberg, et al., 2017). Usually they have poor education, health, economic and social status, along with other disadvantages.

Discussion

The insufficient research in the field of patient empowerment through mHealth apps (Research2Guidance, 2017) has been demonstrated. This is surprising since evidence suggests that mHealth apps contribute to the empowerment of patients and that the development of mobile applications is rapidly growing (Research2Guidance, 2017). However, only a few of them have a longer time of usage and success (Singh, et al., 2016). With the increasing number of mHealth apps on the market, patients are confronted with the problem of over choice of the appropriate mHealth app and they are overloaded with information. Without guidance, finding an appropriate app may be challenging for the patient (Shen, et al., 2015).

We identified nine areas that can influence patient empowerment by using mHealth apps. This review clearly synthesized the emerging problem of low adherence to mHealth apps and patient motivation, the dispute about patient's empowerment, engagement and activation, safety and privacy, the amount of information and patient knowledge. The general usefulness and lack of research in this field was also a highlight for the majority of the authors consulted. Nonetheless, it is consensual that the usage of mHealth apps is quickly shaping the relationship and communication between patients and healthcare professionals.

Implementation of mHealth apps as healthcare intervention could become an important, cost and time effective way to reach a higher number of individuals, but it is becoming obvious that mHealth apps are increasing in the market and, at the same time, lower user engagement is observed. Furthermore, the current review aimed to determine whether sufficient research has been carried out in order to identify the reasons for low mobile apps usage (or discontinuation) and to what extent specific user characteristics influence this phenomenon.

We found the first research of the predictive relationship between baseline user characteristics and utilization of a smoking cessation app. The findings reveal that specific user characteristics for successful use of mHealth apps are unknown. Lower education and heavier smoking were both associated with lower application usage. According to literature, future mHealth apps development should be based on individual characteristics of the desired group of users, which could result in better outcomes than the use of traditional strategies (Zeng, et al., 2015).

The level of patient empowerment was also identified as problematic. Empowered patients have an active role in their treatment process. However, they should possess the necessary knowledge and self-awareness to influence their life. Similarly, Ledford et al. (2017) agreed that activated patients believe that their role is important, that they have the necessary knowledge and confidence to take action, and can enact behaviours to maintain and improve their health. Thus, mHealth apps can have empowering and engaging effects on their users/patients but their adoption and final success will be ultimately determined by the (health) system encouraging their use. Risling (2017) indicated that we need an empirical tool to evaluate patient empowerment in association with eHealth/mHealth inventions. It is not sufficient to promote the empowering effects of new digital health solutions without an accompanying evaluation of the actual influence of the intervention in this area.

When using various mHealth apps, it is important to note that patients often have no insight into the desired and effective functions, and are rarely involved in mHealth apps development. It is necessary to identify and investigate mHealth apps effect on behaviour changes and inclusion and their impact on the results of interventions. Due to the lack of research conducted in this field, it is impossible to evidence their effectiveness (Sama, et al., 2014).

We have to consider the safety issue as the data privacy problem and from another perspective. With so many mHealth apps available, are patients able to choose the most appropriate mHealth app for their illness and do they provide accurate health information (Bhuyan et al., 2017)?

Digital health technology is not effective when patients do not have the necessary knowledge to use these tools or medical devices such as mHealth apps. The same applies to healthcare personnel (doctors, nurse, etc.). Therefore, digital literacy concerns everyone, including nursing or medical students. Successful use of appropriate digital health literacy is essential, so students who are usually skilled in the use of digital technologies need to raise their level of functional digital health literacy so that they can transfer this knowledge to patients and/or their relatives. Hopia (2015) claims that teachers need to have a positive attitude towards digital solutions and have the competences to facilitate the learning process of nursing/medical students to assume a more active role in using mHealth apps to support patient self-management. Learning environment at universities should be properly equipped as regards eHealth solutions in patient self-management. During the education process, students should be empowered for critical evaluation of mHealth apps (Bozikov and Hercigonja Szekeres, 2017).

Due to exponential growth, mHealth apps are on the market earlier than healthcare professionals can check and test their function and efficacy (Boudreaux, et al., 2014). Before being introduced on the market, it is necessary to determine whether they are effective, if they provide accurate information and are user-friendly (Powell, Landman and Bates, 2014). Healthcare providers should make a decision before the distribution of new evidence based mHealth apps versions. This may decrease patients' activation. In order to provide high-quality and safe mHealth apps, it is essential to follow the WHO recommendations on evaluating their inclusion in the treatment of patients (World Health Organization, 2016).

Knowledge is also among the factors that influence the patient empowerment. It is important to remember that the patients must be motivated to enter the learning process. Self-motivated patients have more interest, excitement, and confidence than people who are externally controlled by others. This difference then enhances performance persistence and general well-being even when people have the same level of self-efficacy for the target behaviour (Ledford, et al., 2017).

Despite EU's encouragement and alerting experts to the importance of prevention activities, mHealth apps are still mainly used in the treatment and disease management (European Commission, 2014), where promotion of healthy lifestyle and wellbeing should be the focus of mHealth research and development. A prerequisite for mHealth apps is a strong emphasis on co-designing the healthcare model with user needs as a key driver (Hopia, et al., 2015). It is

anticipated that mHealth apps usage will grow with the promotion of health insurance companies, while distribution by doctors and healthcare institutions, websites and app stores will be reduced (Research2Guidance, 2017). Does this mean that future development will be more focused on disease management instead of on health and well-being?

Based on our literature review findings, the need for further research in this field is mandatory. It is necessary to research and clearly define the impact of mHealth apps on the users, both positive and negative. We also have to identify the tools that can confirm or deny that the patient has achieved empowerment with the help of mHealth app. Research should involve a longer period of testing the app to prove its efficacy. The results of this literature review opened several questions, but the most important question is whether it is ethical and logical to engage modern digital technology in healthy living processes (Taki, et al., 2017) with the purpose to collect user behaviour data in order to improve the application itself?

Further research is needed on patient empowerment in combination with mHealth intervention, since current evidence does not properly address its efficacy. Until a comprehensive measure of patient empowerment is developed and thoroughly evaluated, challenges within the mHealth context will remain with respect to establishing patient empowerment as a means to positively influence health outcomes (Risling, 2017).

Conclusion

A number of new mHealth apps are emerging worldwide. However, in the mobile applications market, a paradox appeared with increasing mHealth apps and a lower number of users. Patients often stop using mobile applications quite quickly for unknown reasons. Patients want to assume more active role in their health treatment, and the patients' independence is becoming increasingly important.

The results of this literature review indicate that patient empowerment is promoted and that mHealth apps engage patients to become more active, more involved and enabled for self-monitoring and self-assessment. Researchers generally do not analyse and clarify how apps really promote the empowerment process itself. Consequently, it is necessary to find measurable changes as a result of empowerment in healthcare behaviours or outcomes. There is a lack of evidence in the literature to confirm the usefulness of apps. A clear association between the use of mHealth intervention, patient empowerment, and health related outcomes remains elusive.

Nurses and other healthcare providers need to be empowered to use mHealth apps in order to properly and continuously implement specific motivational measures for patients to use the recommended mHealth apps.

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THE EXPOSURE OF PRESCHOOL CHILDREN TO TECHNOLOGY AND ITS RELATIONSHIP TO CHILDREN'S PLAY

IZPOSTAVLJENOST PREDŠOLSKIH OTROK SODOBNI TEHNOLOGIJI IN POVEZANOST Z OTROKOVO IGRO

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Abstract

Introduction: *Sensory input represents "food" for the nervous system. Among all sensory systems, the tactile, vestibular and proprioceptive systems are the most fundamental for the development of the various skills crucial for the optimal performance of daily occupations. As new technology becomes increasingly available to children of preschool age, the question arises how this affects the development of these basic sensory systems through various forms of play. This study, conducted in Slovenia and Croatia, aims to answer the question: What is the relationship between the frequency of technology use and participation in sensory-rich play based activities among preschool children?*

Methods*: This pilot study adopted a quantitative approach in which data were collected cross-sectionally through dissemination of an online questionnaire. This questionnaire was designed for the purpose of this research using the open source application for online surveys 1KA. The study participants were recruited via a 'snowball' method using simple random sampling. To participate in the survey, parents of preschool children aged between 2 and 6 years were invited by e-mail or via the Facebook social network. The research took place during the period from October 10, 2017 to November 11, 2017. The data collected were quantitatively analysed using descriptive and inferential statistics.*

Results: *Using descriptive statistics, the findings indicate that preschool-aged children spend far greater amounts of time using various types of technology than it is currently recommended by the American Association of Pediatrics and what is considered a reasonable limit by their parents. Furthermore, the findings demonstrate that children who spend more time using media are significantly less involved in sensory-rich play activities than children who spend less time using technological devices.*

Discussion: *Presently, research regarding technology use and play among preschool children is insufficient and inconclusive (DeShetler, 2014). As occupational therapists, we recognize that active participation in the everyday occupation of play is an important contributor to children's health and development. By shedding further light on the relationship between technology use and play, we hope that the present study will support further work in promoting*

play. Based on the findings of our research, we also plan to develop guidelines for parents of preschool children, if necessary, regarding the importance of taking into account sensory needs in their children's development.

***Keywords**: preschool children, sensory needs, play, occupational therapy, modern technology*

Izvleček

***Uvod:** Senzorni občutki predstavljajo "hrano" za živčni system. Izmed vseh senzornih sistemov so taktilni, vestibularni in proprioceptivni najbolj osnovni in pomembni za razvoj različnih spretnosti, ki so temelj za optimalno izvajanje vsakdanjih dejavnosti. Ker je v zadnjem času sodobna tehnologija dosegljiva tudi otrokom v predšolskem obdobju, se ob tem pojavlja vprašanje kako to vpliva na razvoj teh osnovnih senzornih sistemov preko različni oblik igre. Zato smo se odločili raziskati pogostost uporabe različnih naprav sodobne tehnologije in ravnovesje z ostalimi neelektronskimi aktivnostmi pri otrocih v predšolskem obdobju S ta raziskavo, ki jo bomo izvedli v Sloveniji in na Hrvaškem, želimo odgovoriti na naslednje vprašanje: Kakšna je povezanost med uporabo sodobne tehnologije pri predšolskih otrocih in njihovo participacijo v senzorno bogate aktivnosti?*

***Metode:** V pilotni raziskavi je bil uporabljen kvantitativni pristop, izvedena je bila presečna študija. Podatki so zbrani z vprašalnikom, ki smo ga oblikovali za namen te raziskave preko odprtokodne aplikacije za spletno anketiranje 1KA. Udeležence bomo pridobili z metodo "snežne kepe", uporabljeno bo enostavno slučajnostno vzorčenje. K sodelovanju v raziskavi smo po e-pošti ali preko socialnega omrežja Facebook povabili starše predšolskih otrok, ki so stari med 2 in 6 let. Raziskava je potekala od 10.10. do 11.11.2017. Pridobljene podatke smo kvantitativno statistično obdelali z deskriptivno in inferenčno statistiko.*

***Rezultati:** Ker faza pridobivanja podatkov še poteka, trenutno še ne moremo posredovati rezultatov. Pri analizi podatkov smo usmerjeni v primerjavo rezultatov obeh držav in analizo po različnih starostnih skupinah.*

***Razprava:** Raziskav, ki se nanašajo na uporabo sodobne tehnologije in igre med predšolskimi otroki, trenutno ni dovolj. Kot delovni terapevti ugotavljamo, da aktivna participacija pri vsakodnevnih dejavnostih igra pomembno vlogo pri zdravju in razvoju otrok. Upamo, da bo naša študija z ugotavljanjem razmerja med uporabo tehnologije in igro, podprla nadaljnje delo v smeri promocije igre. Na podlagi ugotovitev naše raziskave načrtujemo po potrebi tudi razvoj smernic za starše predšolskih otrok glede pomena upoštevanja senzornih potreb pri razvoju njihovih otrok.*

***Ključne besede:** predšolski otrok, senzorne potrebe, igra, delovna terapija, sodobna tehnologija*

Introduction

Rapid technological advancements over the past 20 years have created societies in which computers, tablets, smart phones and televisions are increasingly common tools used in everyday life. It is unsurprising, therefore, that young children are spending more and more

time making use of these types of technology (Kabali, Irigoyen and Nunez-Davis, 2015). A growing body of literature has demonstrated that children are increasingly relying on technology for play and learning activities and, as a result, are adopting more sedentary lifestyles with limited opportunities for active, creative and imaginary forms of play (Barr-Anderson, et al., 2008; Downing, et al., 2017; Xu, et al., 2016). This is also true for even the youngest generations, where infants and young children use modern digital technologies on a daily basis (Kabali, Irigoyen and Nunez-Davis, 2015). The total amount of time children spend in front of television, computer, mobile phone or video game console screens has garnered such interest in the media and literature that it has been given its own term: *screen time* (e.g. Twenge, et al., 2017; Van der Geest, et al., 2017).

In response to growing concerns over the impact of increasing screen time among children, various health organizations have provided clear recommendations for limiting the amount and type of media use in various age groups. For example, the American Association of Pediatrics (AAP) (2016) recommends that for children aged 2 to 5 years screen time should be limited to one hour a day of high-quality programming. For children under the age of 2 years, the AAP discourages any media use, except for video-chatting. However, the trend towards increasing exposure to technology among young children shows little evidence of slowing down. Recent research in North America has demonstrated that youth spend an alarming 7.38 hours consuming media per day (Rideout, Foehr and Roberts, 2010). This trend is also evident in different contexts and age groups. For example, the data from an Australian study (Xu, et al., 2016) demonstrate that very young children spend up to 2.5 hours in front of a screen. Similarly, the studies recently conducted in Croatia and Slovenia indicate that screen time among preschool-aged children was well above the current World Health Organization recommendations (Poliklinika za zaštitu djece i mladih grada Zagreba, 2017; Rek and Milanovski, 2016).

What is the impact of growing amounts of screen time on children's development? A significant body of literature has examined the impact of media use on children and adolescents, with the focus of attention to growing rates of childhood obesity (Anderson, Economos, and Must, 2008; Suglia, et al., 2013) and Type 2 diabetes (Nightingale, et al., 2017) and their correlation with increasingly sedentary lifestyles. Children's use of rapidly advancing technologies, characterized by intense, high-speed visual stimulation, has also been linked to an increased prevalence of cognitive, behavioural and psychological difficulties, including poor self-regulation and aggression (Christakis and Zimmerman, 2007); language (Chonchaiya and Pruksananonda, 2008; Zimmerman, Christakis and Meltzoff, 2007) and cognitive delays (Tomopoulos, et al., 2010; Lin, et al., 2015); attention and problem-solving difficulties (Christakis, et al., 2004; Landhuis, Poulton, Welch and Hancox, 2007; Swing, et al., 2010); sleep disturbances (Cespedes, et al., 2014; Vijakkhana, et al., 2015); and problems with socio-emotional well-being (Hinkley, et al., 2014; Pagani, et al., 2010; Tomopoulos, et al., 2007).

Although the nature of the relationship between growing rates of media use and various developmental difficulties remains equivocal and warrants further empirical investigation, a potentially important factor mediating children's media use and negative developmental outcomes is the consequent reduction of play diversity (Anderson, Economos and Must, 2008).

Indeed, previous research has indicated that engaging in various forms of screen time is associated with less time spent engaging in active, social and creative play (e.g. Vandewater, Bickham and Lee, 2006). In young children, this reduction in time spent engaged in play is worrying for a number of reasons. First, learning at this age is dependent on active and social interaction with trusted adults to develop cognitive, language, motor and social-emotional skills (Barnett, 1990; Erikson, 1985; Tamis-Lemonda, et al., 2004; Tsao, 2002). Through play, children interact with other people and the world around them (Hurwitz, 2003), develop positive relationships and increased self-confidence, and learn how to make decisions and solve problems (McElwain and Volling, 2005). As such, replacing opportunities for interactive, hands-on play with technological alternatives removes critical opportunities for development in a number of areas (Ginsburg, 2007).

Similarly, technology-based activity also reduces time spent in types of play that offer a more varied range of sensorimotor experiences. The processing and integration of the vestibular, proprioceptive and tactile input offered through 'typical' childhood play activities is critical for supporting the development of postural stability, motor coordination and self-regulation necessary for acquiring skills required for performing daily childhood activities (Ayres, 2005; Biel and Peske, 2009). As new technology is becoming increasingly available to children of preschool age, the question arises how screen time affects the development of these basic sensory systems through various forms of play.

Based on the above discussion, it seems reasonable to argue that the changing lifestyles of today's children, in part characterized by increasing amounts of screen time and a reduction of time spent in active, exploratory play, has potentially serious implications for children's development, health and well-being. Furthermore, by reducing opportunities for participation in a range of everyday childhood occupations, excessive 'screen time' has potential implications for children's engagement in home and community life.

Methods

Research question

In order to gain a better insight into potential consequences of media use on young children's development through play, it was first necessary to confirm the hypothesized relationship between media use and play. Although it was expected that higher rates of technology use would be associated with lower and less diverse levels of active, sensory-based play, the primary aim of the present study was to collect descriptive data about the amount of time preschool children spend using technology (screen time) and participation in various play activities.

Specifically, the study aimed to address the following research questions:

1. How much time do preschool children spend using various forms of technology?
2. What is the relationship between the frequency of technology use and participation in sensory-rich play based activities among preschool children?

Research method/Questionnaire

The study adopted a quantitative approach in which data were collected cross-sectionally through dissemination of an online questionnaire: *Survey of technology use among preschool children*. The questionnaire was disseminated to participants in Slovenia and Croatia using the open source application for online surveys 1KA. The questionnaire, prepared in Slovenian and Croatian languages, includes 10 question sets collecting information about average time spent using technology daily (parent and child); availability of technology in the child's bedroom; parents' opinion and decisions concerning their children's screen time; parental involvement in their children's screen time; frequency of child's involvement in various play activities; child's behaviour during everyday activities. The questions investigating the children's technology use were adapted from the Slovenian questionnaire *Mediji in predšolski otroci* (Media and preschool children) with the permission of the authors (Rek and Milanovski, 2016). Questions, enquiring about children's participation in sensory-rich play activities, were developed by the authors for the purpose of this research. The questionnaire included also 10 socio-demographic questions. In total, the questionnaire consisted of 114 items. The reliability of the questionnaire was assessed using Cronbach coefficient alpha. For the scale examining the amount of time spent using technology, Cronbach's alpha was 0.745. For the Likert scale examining children's involvement in play activities, it amounted to 0.839.

The study participants were recruited via a 'snowball' method using simple random sampling. Participants were invited to participate in the study via e-mail or the Facebook social network. Data collection took place during the period from October 10 to November 11, 2017.

Sample

The final sample included 1086 parents of preschool children aged between 2 and 6 years. After data reduction and the exclusion of only partially completed questionnaires, the final sample consisted of 754 participants (130 from Slovenia and 612 from Croatia; 12 participants did not state their country of origin). Parents of more than one preschool-aged child were asked to complete the questionnaire for the eldest child. The majority of participants were aged between 31 and 40 years (70.4%) and 93% were mothers. Participants' level of education ranged from completed post-secondary education (76.9%) and completed secondary education (22.4%). The majority of participants (65.3%) perceived their financial circumstances as average and 32.6% as better than average. The age and gender of the children about whom parents completed the survey was evenly distributed: 16.6% 2-year-olds, 22.8% 3-year-olds, 24.4% 4-year-olds, 19.4% 5-year-olds and 16.8% 6-year-olds; 47.2% girls, 52.5% boys (2 missing values). The majority of children regularly attended kindergarten (75.7%) and were reported by parents to exhibit typical developmental levels (95%). For children not attending kindergarten, daytime caregivers were parents or grandparents.

The data were analysed using descriptive (frequencies and percentages) and inferential statistics. The Chi-square test was used to determine the association between children's participation in various play activities and the amount of screen time. For this purpose, data on media use were used to collate the sample into two groups: 1) children who use media from 0

to 45 minutes daily, 2) children who use media 60 minutes or more daily. Data analysis was performed using the SPSS v.24 for Windows software. The level of statistical significance was determined as $p<0.05$ and instances of statistical non-significance are recorded as NS.

Results

Q1: How much time do preschool children spend using various forms of technology?

Table 1 presents the time (in minutes) that children in different age groups spend engaged in various technology-based activities daily. In all age groups, the total mean time is over 2 hours daily, with the amount of time spent using various forms of media increasing with age.

Table 1. Time (in minutes) children spend using various forms of technology daily

Variables	M_{2Y^-}	M_{3Y}	M_{4Y}	M_{5Y}	M_{6Y}	M
Watching TV	52.87	57.1	68.85	61.36	70.98	62.50
Watching DVD	37.07	47.41	43.30	50.96	45.25	44.98
PC_E-tablet	17.80	23.00	22.11	31.68	30.86	24.89
E-games	5.78	10.21	9.02	17.61	22.93	12.71
Mobile phone	21.83	22.99	17.44	18.11	19.13	19.88
Total time	135.35	160.92	160.72	179.72	189.15	164.96

**M=mean;2Y=2 years*

Q2: What is the relationship between the frequency of technology use and participation in sensory-rich play based activities among preschool children?

To examine the association between children's media use and play, the data presented above were compared to data gathered from a series of questions in which parents indicated the frequency of their child's involvement in various sensory-rich play activities on a 5-point Likert type scale. For the purposes of analysis, items related to various play activities were classified into three categories according to the three main domains of sensory integration, where each category included play activities with predominantly tactile, proprioceptive and vestibular sensory input, respectively. While a distinction based on the single dominant sensory feature was made wherever possible, some variables are included in more than one group as most of the play activities included in the questionnaire represented activities in which children receive input from more than one sensory domain. In Table 2, the percentages of parents indicating that their child participated in an activity never/rarely and often/always is presented. Here, the first (1 and 2) and the last (4 and 5) two response values were grouped together.

Table 2. Frequency of children's involvement in various play activities categorised by their dominant sensory feature (shown in percentages) and the relationship between media use and participation in sensory-rich play based activities (statistically significant associations indicated with p values)

Dominant sensory feature	Variable	Play frequency (%)*		Chi-Square Play+media use			
		never/ rarely	often/ always	PC_ tablet	E-game	Mobile Phone	DVD
Tactile	Outdoor walk and play in the cold/ rainy weather	11.2	**66.5**	NS	NS	**.012**	NS
	Playing in the sand/dirt	5.5	**72.9**	NS	NS	NS	NS
	Playing with grass or leaves	9.3	**68.0**	NS	NS	**.024**	**.014**
	Playing with water	**8.5**	**59.1**				
	Playing with pets	24.2	**52.4**	.047	NS	NS	.012
	Art/creative play (Play-Dough, clay, glue, crayons, watercolour, etc.)	7.4	**63.7**	NS	NS	**.049**	**.020**
Proprioceptive	Rough play: wrestling, tug-of-war	32.1	43.5	NS	NS	NS	NS
	Climbing a ladder or net	8.4	**72.2**	NS	NS	NS	NS
	Climbing a tree	**49.4**	24.5	NS	NS	NS	**.036**
	Going through a tunnel	**17.9**	**46.7**	NS	NS	NS	NS
	Running	0.4	**97.6**	NS	NS	NS	NS
	Dancing	3.4	**82.2**	**.015**	NS	NS	NS
Vestibular	Playing with the head down ("aeroplane", "wheelbarrow")	33.5	34.1	NS	NS	NS	NS
	Playing throw-and- catch in the air	42.9	33.5	NS	NS	NS	NS
	Swinging	3.9	**84.0**	NS	**.006**	NS	NS
	Playing on a slide	2.0	**86.9**	**.034**	NS	NS	NS
	Riding a merry-go-round	13.7	**56.5**	NS	NS	NS	NS
	Riding bicycle, tricycle, skateboard, scooter	14.1	**68.3**	NS	NS	NS	NS
Tactile–Vestib.	Rolling in the grass	**44.9**	26.3	.043	NS	NS	NS
Tactile-Propr.	Cuddling, hugging and/or tickling	1.3	**94.8**	NS	NS	NS	NS
Propr.-Vestib.	Walking on a beam	14.4	**62.1**	NS	NS	**.002**	NS
All senses	Walking in the woods	25.8	37.8	**.012**	NS	NS	NS
	Playing with a ball	2.6	**80.1**	**.011**	NS	NS	NS
	Playing with other children	2.0	**90.7**	**.015**	NS	**.004**	**.037**

* never/rarely: never/several times a year; often/always: several times a week/every day. Values indicate percentage of parents who indicated that their child participated in the activity never/rarely or often/always.

In order to establish the relationship between technology use and participation in various play activities, the Chi-square test was employed. For each activity, variables that demonstrated statistically significant associations are presented in Table 2, where p,-values in bold font

represent instances in which greater amounts of technology use was associated with less frequent participation in sensory-rich play activity. In other instances (regular font), greater amounts of technology use was associated with more frequent participation in the activity. In cases where the p-value was <0.05, response proportions were checked in crosstabs tables. For instance, 55% of children who use a mobile phone 60 minutes or more daily often or always participate in outdoor walks, while 67% of children who use a mobile phone less than 60 minutes participate in outdoor walks on a daily basis. Similarly, 52% of children who spend over 60 minutes daily on a mobile phone, often or always participated in art or creative play, while 66% of children who spend less than 60 minutes daily on a mobile phone, participate in these activities on a daily basis. Children, who spend more than 60 minutes daily playing electronic games or using a PC/tablet, are also less likely to regularly participate in the activities, such as swinging (69%) or ball play (72%) in comparison to children who spend less than 60 minutes performing these activities (85% swinging and 82% playing with a ball). Finally, while 79% of children who use a mobile phone for more than one hour daily, regularly play with other children, while 93% of children who use a mobile phone less than one hour daily play with other children on a daily basis.

Discussion

For children aged between 2 and 5 years, the American Academy of Pediatrics (AAP) recommends limiting 'screen use to 1 hour per day of high-quality programs'. These recommendations, originally announced in 2016, also include advice on balancing media use and 'unplugged' time filled with health-promoting behaviours critical for learning, such as 'physical activity, hands-on exploration and face-to-face social interaction in the real world.

The findings of the present study indicate that children's use of various forms of technology on average amounts to over 2.5 hours daily. Similar results were obtained also in the very youngest age group (2 years). These findings are consistent with those from a similar study demonstrating that children aged up to five years spend, on average, 2.4 hours in front of a screen on weekdays and 3.1 hours at weekends, with a visible trend of increasing screen time in older age groups (Poliklinika za zaštitu djece i mladih Grada Zagreba, 2017).

A growing body of research has demonstrated the various negative effects of the increasing number of hours children spend in front of a screen. As occupational therapists, we were especially interested in the relationship between children's technology use and participation in the most important occupation of childhood – play. More specifically, we were interested in examining whether, and in what manner, technology use is related to children's participation in sensory-rich play based activities.

Our findings suggest that a majority of parents provide regular opportunities for various forms of play, most commonly including running, cuddling or tickling, sliding, swinging, dancing, and playing with a ball. These are readily available in a child's physical surroundings, such as in their home or on a playground. In contrast, opportunities to engage in various forms of more intense proprioceptive and vestibular play and to participate in activities in natural surroundings were less common. These activities represent valuable vestibular, proprioceptive

and gross motor experiences that provide opportunities for sensorimotor development and for practicing social skills.

When data related to media use and participation in play activities were analysed, a number of interesting findings arose. Firstly, no association was established between the amount of time spent watching television and participation in sensory-rich play activities. In contrast, there was an association between children's participation in various activities and the amount of time spent using a computer, tablet or mobile phone, watching a DVD and playing video games, where greater amounts of technology use were related to less frequent participation in a variety of sensory-rich activities. Arguably, this difference suggests that television has become a more or less 'universal' form of media use, while newer forms of technology offering more fluid and interactive content tend to take time away from play activities. Interestingly, our analysis also indicated a small number of instances in which greater amounts of technology use (computer/tablet, DVD) was related to more frequent participation in specific play activities (playing with a pet, rolling in the grass). This exception highlights the fact that children's participation in active, exploratory and creative play is also mediated by other factors, which are not directly addressed in this study. The latter include the degree to which children are engaged in other structured/organized activities, the amount of parents' available time for supporting play, or the specific needs, routines, habits of a particular child or family (Ginsburg, 2007). Indeed, the relationship between media use and play, and the role of various mediating factors in particular, warrants further attention in future research.

Nevertheless, the findings of the current study seem to support the argument in the literature that increasing screen time takes time away from other typical activities of childhood, including active, sensory-based and creative play (Ginsburg, 2007; Strasburger et al., 2012). As was presented in the introduction, such trends pose a serious risk for a range of harmful consequences for children's development, health and well-being. While parents are often aware of the need to limit their children's media use, these limitations are rarely enforced in practice. As such, more specific guidelines and information might be useful in supporting parents in selecting reasonable amounts/forms of media and ensuring regular opportunities for active, sensory-rich play.

The findings of the present study should be considered in light of a number of limitations. Firstly, the decision to use an online questionnaire distributed via social networks limited the degree to which administration and completion of the questionnaire was standardized and randomized. As a result, our data contained missing data for a number of variables, thus limiting the type of analysis that could be performed. In addition, the use of an online survey also increases the possibility of a non-representative sample. In order to avoid these limitations, future research examining these issues might be implemented in settings such as Kindergartens or pediatric practices in order to gain a more diverse, representative sample. We have also noted that a number of variables were not included in the questionnaire (e.g., amount of time spent in play activities, child's skill/function during play, child's participation in organized activities outside of preschool). These variables should be included in future exploration of this topic in order to better understand the relationship between media use and play among young children.

Conclusion

This study represents the first attempt in Croatia and Slovenia to establish the association between technology use and involvement in sensory-rich play activities among preschool children. According to our findings, preschool children spend more time using various forms of technology than currently recommended. Our findings also demonstrate that preschool children participate in various play activities, while the relationship between the amount of technology use and participation in sensory-rich play based activities among preschool children is unclear. While greater amounts of media use (except TV watching) were related to less frequent participation in various sensory-rich activities, increased use of some forms of technology (computer/tablet, DVD) was related to more frequent participation in a few specific play activities. This suggests that children's participation in active, exploratory and creative play is mediated also by other factors not directly considered in this study. In order to gain further insight into the relationship between children's media use and participation in sensory-rich play, further research should use more precise measures of children's participation in sensory-rich play and consider these variables more detail . Furthermore, it is recommended that guidelines for parents be developed as regards the amount of screen time while recognising the importance of regular participation in sensory-rich play. Armed with specific strategies for incorporating a more balanced and diverse range of developmentally appropriate play activities in everyday routines, parents will be able to more actively promote their children's health and development.

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Plenary paper

THE IMPACT OF ONLINE COUNSELLING ON SAFE MEDICATION USE

VPLIV ONLINE SVETOVANJA NA VARNO UPORABO ZDRAVIL

Nada IRGOLIČ

Moderatorka foruma Zdravila in zakonodaja pri Zavodu Med.Over.Net
Članica: Zdravstvenega sveta pri Ministrstvu za zdravje
Članica: Komisije Republike Slovenije za medicinsko etiko

Abstract

Digitalisation in healthcare, particularly with regard to medicine, constitutes a new approach to preserving health. For users, digitalisation has great benefits, as it enables easier and anonymous access to information about medicinal products. For the moderator of the forum, on the other hand, it presents a great professional challenge and responsibility. As a rule, the information provided by users is insufficient for successful and, above all, safe pharmacotherapy, and allows many unknowns which should be addressed in order to assess the health condition and choose between the benefits and risks of the proposed solutions. The main purpose of cooperation with Med.Over.Net Institute was to inform users about the legislation on medicinal products and to provide advice to patients, taking into consideration the potential benefits and health risks as well as all aspects of medical therapy.

Moderating the Medicinal Products and Legislation (Zdravila in zakonodaja) forum included several thousand answers to anonymous people seeking advice. It was established that accessing medical products via the Internet is very common in Slovenia, which enables many opportunities to abuse or use counterfeit medical products, as well as the use of illegal substances and tranquilisers. Furthermore, it was found that the young are not familiar with the safe use of medicines/medications and that most of them are not aware of their responsibility for their health. In the 14 years of participating in the Medicinal Products and Legislation forum, we collected several thought-provoking evidence. More should be done to raise awareness on the safe use of medicinal products available over the Internet, particularly among the young. We found and confirmed that the excessive use of psychoactive medicines is increasing , pointing to an escalation in mental health issues, which should be a prominent reminder to the authorities to take action. With regard to the older population, we largely confirmed the prevalence of polypharmacy, which should be studied in greater detail.

Keywords: *pharmacotherapy, self-treatment, polypharmacy.*

Izvleček

Digitalizacija na področju zdravstva in še posebej na področju zdravil pomeni nov pristop, katerega cilj je ohranjati zdravje. Za uporabnike vsekakor pomeni veliko prednost v lažjem in anonimnem dostopu do informacij o zdravilih, za moderatorja foruma pa predstavlja velik strokovni izziv in odgovornost. Za uspešno in predvsem varno farmakoterapijo so informacije s strani uporabnikov večinoma pomanjkljive in dopuščajo vrsto neznank, katerih poznavanje je nujno potrebno za oceno zdravstvenega stanja ter tehtanja koristi in tveganj ponujenih rešitev. Osnovni namen sodelovanja z Zavodom Med.Over.Net je bilo informiranje uporabnikov v zvezi z zakonodajo na področju zdravil in svetovanje bolnikom ter zasledovanje njihovih koristi z upoštevanjem vseh vidikov terapije z zdravili in z upoštevanjem možnih nevarnosti, ki bi lahko ogrozile njihovo zdravje.

Moderiranje foruma Zdravila in zakonodaja je temeljilo na nekaj tisoč odgovorih anonimnim iskalcem nasvetov. Ugotovili smo, da je tudi v Sloveniji dostopnost zdravil preko interneta zelo pogosta, kar dopušča vrsto možnosti zlorabe in uporabe ponarejenih zdravil, da je tudi pri nas močno razširjena uporaba prepovedanih substanc in pomirjeval, da so predvsem mladi neosveščeni glede varne uporabe zdravil in da se jih večina ne zaveda odgovornosti za lastno zdravje. V 14 letnem sodelovanju na forumu Zdravila in zakonodaja smo prišli do spoznanj, ki terjajo tehten premislek. V zvezi z dostopnostjo zdravil preko interneta je potrebno narediti več na področju osveščanja o varni uporabi zdravil še posebej pri mladih. Ugotovitev in potrditev naraščajočega trenda pretirane uporabe psihoaktivnih zdravil kaže na poglabljanje duševnih stisk, kar pomeni zelo resen opomin in terja ukrepanje pristojnih oblasti. Problematika starejšega dela prebivalstva je tudi v našem primeru v veliki meri potrdila polifarmacijo, čemur je potrebno posvetiti več pozornosti.

Ključne besede: *farmakoterapija, samozdravljenje, polifarmacija.*

Uvod

Osnovni namen delovanja Zavoda Med.over.net, ki ga je ustanovil Primož Cimerman, je bil ustvariti ljudem dostopen sistem, ki bi jim bil v pomoč z nasveti glede varovanja zdravja, uporabe zdravil, izobraževanja, starševstva in medsebojnih odnosov. Glavni moto njegove ideje je bil pomagati ljudem v stiski.

Namen sodelovanja z Zavodom Med.Over.Net je bilo v začetku informiranje uporabnikov v zvezi z zakonodajo na področju zdravil. V času, ko je Slovenija vstopila v Evropsko skupnost, je tudi pri nas stopila v veljavo evropska zakonodaja na področju zdravil. Slovenija je sprejela nov Zakon o zdravilih, ki je bil v celoti harmoniziran z evropskim pravnim redom. Novi zakon o zdravilih se je v določenem delu precej razlikoval od zakonodaje, ki je urejala to področje pred našim vstopom v evropske povezave. Posebej je bila zaznavna sprememba v ustanavljanju specializiranih prodajaln na področju trgovanja z zdravili, ki se lahko izdajajo brez recepta, kar je bilo z vidika dostopnosti zdravil in iz finančnega vidika dokaj zanimivo.

Zaradi novo sprejete zakonodaje o zdravilih in medicinskih pripomočkih je bilo povpraševanje po nasvetih v zvezi z izdelavo zdravil, in pogoji trženja zdravil in medicinskih pripomočkov

ter upravnimi postopki precej aktualno. Da je strokovno svetovanje potrebno, se je izkazalo s številnimi vprašanji naslovljenimi na Med.Over.net.

Z ozirom na dejstvo, da živimo v času, ki našim bolnikom ni najbolj naklonjen, ko dostopnost do zdravljenja ni več zlahka dosegljiva, je prišlo sčasoma tudi do vprašanj, ki niso bila več v skladu s samim naslovom foruma. Posegala so na številna področja in terjala vrsto nasvetov. Iz vprašanj je bilo razbrati velike stiske mladostnikov, zasvojenih oseb, in oseb, ki so preko različnih medijev podlegale strokovno nepotrjenemu oglaševanju različnih izdelkov, ki so se jim pripisovali zdravilni učinki. To so v glavnem starejši ljudje, ki večinoma jemljejo več zdravil sočasno in posegajo tudi po dobro oglaševanih izdelkih, med katerimi so tudi prehranska dopolnila, ki obljubljajo učinke, ki pa večinoma niso dokazani, kot ni dokazana njihova varnost in kakovost.

Ker je osnovni cilj svetovanja bolnim ljudem preko spleta, zasledovanje njihovih koristi, z upoštevanjem vseh vidikov terapije z zdravili in z upoštevanjem vseh možnih nevarnosti, ki bi lahko ogrozile njihovo zdravje, je tako svetovanje zelo odgovorno dejanje.

Zasnova moderiranja foruma Zdravila in zakonodaja je anonimno, brezplačno svetovanje in ni bila zastavljena tako, da bi omogočala izbiro posebnih metod dela, ki bi jih bilo moč statistično prikazati, ker je temeljila na različnih pristopih. Ti pa so bili odvisni od vrste in resnosti problemov posameznikov, motiviranosti uporabnikov foruma in od stopenj zavzetosti za zdravljenje ter upoštevanje nasvetov.

V prispevku se bomo osredotočili na najbolj izstopajoče probleme, ki so po svoji naravi zelo pomembni za ohranjanje zdravja. Namen prispevka je opozoriti širšo javnost na te probleme, ki po svojem obsegu terjajo tehten premislek in ukrepanje pristojnih organov države, katerih osnovna naloga je skrb za javno zdravje.

Varna uporaba zdravil pri mladostnikih

Možnost anonimnega dostopa do nasvetov ocenjujemo posebej še pri mladih ljudeh kot izjemno pozitiven dosežek pri varovanju zdravja. Ne samo, da so mladi ljudje v zvezi z zdravjem v dobršni meri nepoučeni, jih na drugi strani omejuje nelagoden občutek zadržanosti pred odkritim pogovorom o svojih težavah. Pri svojem delu smo prišli do prenekaterih spoznanj, kaj vse spregledamo pri izobraževanju mladih ljudi in kaj bi morali na tem področju storiti še, da bi bili z rezultati svojega dela lahko zadovoljni.

Navajamo samo primer mladih, ki so v tem obdobju običajno zelo obremenjeni s svojim videzom, in ravno v tem času trpijo zaradi težjih oblik aken. Večinoma poiščejo pomoč pri zdravnikih, kar je prav, vendar v večini primerov tudi to ni dovolj. Učinkovito zdravilo, ki se v teh primerih predpisuje ima vrsto resnih neželenih učinkov, ki so lahko v nekaterih primerih tudi usodni.

Kljub temu, da je zdravilu priloženo skrbno napisano navodilo za uporabo zdravila z vsemi omejitvami in zaščitnimi ukrepi, tudi ukrepi glede preprečevanja zanositve, so vprašanja pokazala veliko nepoznavanje njegove uporabe in še bolj nevarnosti, ki jih je ogrožala. Veliko

mladih navodila za uporabo zdravila sploh ni prebralo, ali pa jih zdravniki niso dovolj natančno opozorili na nevarnosti. Zdravilo je teratogeno, kar pomeni, da lahko pride do težjih okvar plodu v primeru zanositve, kot so na primer okvare centralnega živčnega sistema, spremembe obraza, okvare srca in žilja ter druge.

Vprašanja, ki so bila zastavljena kot na primer: «….tablete sem nehala jemati, kajti zdravnik mi je povedal, da povzročajo neplodnost….«, ali »…..jemljem tablete proti aknam in ne uporabljam zaščite proti zanositvi, upam da to ni noben problem…...«, so bila ena najbolj bolečih spoznanj.

Iz teh vprašanj je razvidno, kolikšna je odgovornost zdravnika, ki zdravi in odgovornost bolnikov, ki se zdravijo, za otroke, ki bi se lahko rodili neosveščenim staršem in celo življenje trpeli posledice njihovega neodgovornega ravnanja. To je problematika, ki zadeva tako posameznike, kot celotno družbo.

Da je problem aktualen in zelo resen kaže število bralcev te teme na forumu, ki jih je bilo do letošnje jeseni 10.195.

Zdravila, ki vsebujejo psihoaktivne snovi

Dostopnost do informacij o zdravilih na spletu je sicer koristna za ocenjevanje zdravstvenega stanja prebivalstva, po drugi strani pa je lahko tudi problematična, če uporabniki spleta te informacije sprejemajo in razumejo na način, ki jim ga dopušča njihova stopnja izobrazbe.

Nizka stopnja razumevanja delovanja zdravil posebej izstopa v primerih stisk, izgorelosti in depresije tudi pri mladih in zelo mladih osebah. Pojavljajo se vprašanja, kako nujno na legalen in največkrat tudi nelegalen način priti do zdravil, ki bodo odmaknile realnost, ki ni prijazna. To niso vedno osebe, ki se zdravijo pri strokovnjakih, temveč so tudi osebe, ki same na lastno odgovornost blažijo svoje težave. Potrebe po psihoaktivnih zdravilih niso samo začasne, obstajajo nedoločen čas, se ponavljajo in so na žalost vedno bolj pogoste. Uporaba teh zdravil pa v zelo veliko primerih sploh ni nadzorovana.

Zdravila namreč niso izdelki splošnega pomena, temveč je vanje vgrajenega veliko znanja, sredstev in preiskav ter testiranj, preden postanejo zdravila. Njihova uporaba je ne glede na to, da imajo dovoljenje za promet z zdravilom, nenehno tehtanje med koristjo in tveganjem, kar razume lahko samo strokovnjak, farmacevt in zdravnik. Vsako površno razumevanje vedenja o zdravilih se lahko maščuje, kar pa marsikdo težko razume. Na to temo je bilo zastavljenih veliko vprašanj.

V takem primeru je pomembno, da se poglobimo v te ljudi, za kar pa ni dovolj samo strokovnost, potrebna je velika mera empatije in previdnosti. Najtežje je, kako pripraviti žrtve teh zdravil, da ponovno zaživijo življenje s čim manj posledicami, ki jih tako samozdravljenje pušča za seboj.

Problem izpostavljamo zato, ker je za prihodnost družbe izrednega pomena in je močno prisoten tudi pri nas. Po podatkih raziskave, ki je bila objavljena v časopisu Delo 21. Dec. 2015

je bilo v letu 2014 v Sloveniji predpisanih 450 tisoč receptov za anksiolitike - ki so zdravila za lajšanje občutka strahu in vznemirjenosti, in 525 tisoč receptov za antidepresive, ki so zdravila za zdravljenje depresij in nekaterih drugih bolezni, kot so tesnobe, panične motnje, socialne fobije, obsesivno-kompulzivne motnje. Od tega je bilo predpisanih 8416 teh zdravil mladoletnikom.

Če k temu prištejemo še številne uporabnike, ki sami na lastno odgovornost jemljejo ta zdravila, in njihovo število ni zajeto v uradnih evidencah, ugotovimo, da je naši družbi, ki šteje komaj malo več kot 2 milijona prebivalcev potrebno posvetiti posebno skrb.

Internet in ponarejena zdravila

Kakor je vpliv spletnega svetovanja o varni rabi zdravil in zdravem načinu življenja lahko pozitiven, tako na drugi strani še vedno dopušča možnosti dostopa do zdravil ali izdelkov, ki se deklarirajo kot zdravila. Kljub temu, da je v EU in tudi v Sloveniji spletna prodaja zdravil regulirana, in ne dovoljuje zlorabe zdravil, kupci še vedno najdejo načine, kako priti do zdravil po lastni presoji in mimo strokovnega nadzora. Večina njih se ne zaveda odgovornosti za lastno zdravje, ko se brez strokovnega posveta izpostavljajo velikemu tveganju.

Na forumu smo zasledili več primerov spletnega nakupovanja izdelkov za izgradnjo mišične mase, sredstev, ki omogočajo hujšanje, zdravil, ki vsebujejo psihoaktivne snovi, ki pomirjajo ali vspodbujajo organizem, zdravil za izboljšanje koncentracije, zdravil za izboljšanje razpoloženja ter še nekaterih drugih.

Spletna trgovina z zdravili pa odpira možnosti trženja ponarejenih zdravil, pred katerimi tudi Evropa ni varna. Tako se je na področju Evropske unije v zadnjem času zaskrbljujoče povečalo število odkritih ponarejenih zdravil, kar zadeva njihovo istovetnost in izvor. Ta zdravila vsebujejo ali ponarejene sestavine slabše kakovosti, ali jih sploh ne vsebujejo. Učinkovine so neznanega porekla, velikokrat izdelane iz potvorjenih surovin, lahko so v napačnih odmerkih, pomožne substance pa niso definirane. Ta zdravila predstavljajo veliko grožnjo za javno zdravje.

Slovenija je tako kot druge države članice Evropske unije na področju zdravil sprejela zakonodajo, ki dovoljuje prodajo preko medmrežja le za tista zdravila, ki se ne izdajajo na podlagi zdravniškega recepta. Obenem določa ustrezno strokovno podporo s svetovanjem in izpolnjevanje določenih pogojev za opravljanje te dejavnosti, kot je na primer uporaba skupnega logotipa, ki ga določi Evropska komisija na podlagi Direktive 2011/62/EU. Poleg tega so z direktivo določeni ukrepi za lažje prepoznavanje ponarejenih zdravil znotraj EU in na njenih zunanjih mejah kjer naj bi se izvajal poostren nadzor nad zdravili.

Ne glede na sprejeto zakonodajo in na vsa opozorila v zvezi ogrožanjem zdravja, si nekateri uporabniki na forumu preko spleta sami med seboj svetujejo možne poti, kako zaobiti vse ovire in še naprej prejemati pošiljke na poštno ležeče v kateri od sosednjih držav.

Na opozorila, ki jih v obliki svetovanja o pasteh, ki jih spremlja tak način prodaje zdravil, posredujemo uporabnikom foruma pogosto dobimo odgovor, iz katerega je razvidno

nerazumevanje in odklonilnost. Kljub temu pa ocenjujemo, da je svetovanje in opozarjanje v tem smislu naložba v javno zdravje.

Polifarmacija

Demografske spremembe, katerim smo priča, postavljajo vedno nove zahteve strokovnjakom na področju zdravljenja z zdravili. Varna in racionalna uporaba zdravil v starosti in predvsem pravočasen obisk zdravnika ter pravilno jemanje predpisanih zdravil, je bila zelo pogosta tema vprašanj na forumu. Še posebej je pomembno pojasnjevanje razlik med izdelki, ki so po svoji naravi zdravila in izdelki, ki se deklarirajo z zdravilnimi učinki in tržijo brez nadzora pristojnih organov.

Spletno svetovanje tej starostni skupini je vsekakor koristno, ker v določeni meri zmanjšuje število obiskov pri zdravniku in v prenekaterih primerih odvrača ljudi od nesmotrne uporabe izdelkov, ki ogrožajo njihovo zdravje. Svetovanje pa je tudi izjemno odgovorno, ker je potrebno pri vsakem primeru posebej presoditi, kdaj je potrebno nujno nazaj na posvet k zdravniku in v katerih primerih privede sočasno jemanje več zdravil hkrati do škodljivega medsebojnega delovanja zdravil.

Na ogroženost te skupine bolnikov vplivajo starostne spremembe, genetski dejavniki, več vrst bolezni hkrati in posledično veliko število predpisanih zdravil, ki jih jemljejo. Vsa ta dejstva vplivajo na presojo svetovalca in vrednost njegovega nasveta, katerega cilj je poiskati možnosti, kako zmanjšati tveganja pri zdravljenju z zdravili.

Starejše življenjsko obdobje zahteva posebno strokovno obravnavo in dobro informiranost bolnikov, za kar pa zdravnik nima vedno podpore v predpisih, ki urejajo njegovo delo. Zato je svetovanje na spletu toliko bolj primerno za bolnike in veliko težje za oblikovanje ustreznih in predvsem varnih nasvetov.

Z raziskavo, ki smo jo leta 2010 opravili na Inštitutu Antona Trstenjaka in je bila objavljena v reviji Kakovostna starost, smo ugotovili presenetljivo visok delež tistih, ki jemljejo tudi precej več kot pet različnih zdravil sočasno.

Ta ugotovitev je pomembno opozorilo vsem, ki sodelujejo v postopkih zdravljenja in tistim, ki so odgovorni za javno zdravje, da je potrebno za učinkovito in varno zdravljenje postoriti nekaj več. Kljub upoštevanju dejstev, da se pri nekaterih bolnikih uporablja kombinirana terapija pri zdravljenju določenih bolezni, je število le teh zaskrbljujoče. Verjetnost za pojav pomembnih interakcij se s številom sočasno vzetih zdravil povečuje, kar zamegljuje izide zdravljenja, ali pa vodi k še povečanem številu zdravil, ki jih bolniki na dan zaužijejo.

Nekritično in mnogokrat tudi strokovno vprašljivo je reklamiranje zdravil, ki jih je moč dobiti brez recepta, tako na spletu kot v drugih medijih, ter druge aktivnosti, ki pospešujejo njihovo prodajo. Tako dodatno vodijo v prekomerno jemanje zdravil in s tem do škodljivih interakcij med zdravili.

Na varnost uporabe zdravil ima pomemben vpliv tudi pretirano jemanje prehranskih dopolnil, ki niso zdravila, a se jim v nasprotju z zakonodajo pogosto pripisujejo zdravilne lastnosti. Bolniki in še posebej starejši ljudje postajajo ciljna skupina za trženje teh izdelkov, ki lahko naredijo tudi precej škode.

Dejstvo je, da dinamika staranja prebivalstva izkazuje pozitivno rast. Ugotovitve pridobljene na podlagi zastavljenih vprašanj so pomembne za ocenjevanje prioritet pristojnih organov, ki načrtujejo razvoj zdravstvenega sistema.

Ugotovili smo, da je obiskanost našega foruma Med.over.net izjemno velika. Izkazalo se je, da je za uporabnike foruma velikega pomena, da pridobijo nasvet anonimno in brezplačno. Vrednost informacij, ki smo jih pridobili iz vprašanj uporabnikov pa je velikega pomena za ovrednotenje stanja na področju javnega zdravja.

Ugotovili smo, da se mladi pogosto ne zavedajo pomena pravilne uporabe zdravil in upoštevanja vseh opozoril, ki so navedena na priloženem lističu.

Poleg tega ni zanemarljivo dejstvo, da vse več mladostnikov posega po zdravilih s psihoaktivnimi snovmi.

Razširjeno je tudi kupovanje zdravil preko spleta mimo vseh s predpisi reguliranih poti, kar odpira možnosti širjenja ponarejenih zdravil in ogroža zdravje posameznikov.

Poleg tega smo ugotovili, da je polifarmacija med starejšim prebivalstvom močno razširjena.

Kljub temu, da je v Sloveniji regulirana in bolnikom prijazna dostopnost zdravil, ki se izdajajo v lekarnah in specializiranih prodajalnah brez recepta ob nasvetu strokovnjakov, se veliko starejših odloča za izdelke, ki sodijo v področje prehranskih dopolnil, katerih poreklo, vsebnost in učinki pogosto niso preverjeni.

Njihova uporaba pa poteka brez strokovnih nasvetov glede medsebojnega učinkovanja z zdravili, ki jih jim je predpisal zdravnik.

Razprava

Prednosti spletnega iskanja nasvetov v večji meri izkoriščajo mladostniki. Vzrokom za te potrebe, bi morali posvetiti več pozornosti.

Ugotovitve o razširjenosti uporabe psihoaktivnih zdravil med mladimi terjajo ne samo premislek, temveč tudi hitro in učinkovito ukrepanje pristojnih oblasti.

Rezultati spletnega svetovanja vsekakor kažejo na problem, ki ni samo problem številnih posameznikov, pač pa tudi družbe kot celote. Postaja namreč eden glavnih javnozdravstvenih problemov, ki mu družba ne posveča ustrezne pozornosti in zamuja s sistemskimi ukrepi.

Gre pred vsem za večinoma mlade ljudi, od katerih bo sčasoma odvisna bodočnost našega naroda.

Problem polifarmacije še posebno pri starejših, je prisoten tudi v naši družbi. Ob tem pa ne gre zanemariti pretirane uporabe načina samozdravljenja, katerega pa ne spremljajo vedno nasveti strokovnjakov. Pretirano in nestrokovno uporabo načina samozdravljenja gre pripisati naraščajočemu trendu pospeševanja prodaje zdravil in izdelkov ter različnih metod zdravljenja, s prekomernim in nekritičnim oglaševanjem. To je vsekakor še dodatno v nasprotju z osnovnim načelom varnega zdravljenja.

Zaključek

V dolgoletnem sodelovanju s forumom na področju varne uporabe zdravil smo prišli do ugotovitev in spoznanj, ki terjajo tehten premislek. Dostopnost nasvetov je vsekakor pozitivno naravnana, dostopnost zdravil preko interneta pa dopušča vrsto možnosti uporabe in zlorabe različnih, tudi ponarejenih zdravil.

Pri vseh bolnikih in tudi pri mladih zdravih ljudeh, ki iščejo pomoč v zvezi s farmakoterapijo, obstaja vrsta neznank, katerih poznavanje je nujno potrebno za oceno zdravstvenega stanja ter tehtanja koristi in tveganj ponujenih rešitev. Zato je svetovanje v zvezi z varno uporabo zdravil preko spleta odgovorno dejanje, predvsem pa velik izziv, ki zahteva strokovni pristop in dobršno mero empatije.

THE RIGHT TO E-HEALTH?

PRAVICA DO E-ZDRAVJA?

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Abstract

***Introduction**: The quality and safety of health services is increasingly dependent on modern electronic or communications technology. Health treatment processes must at the same time focus on the patient and ensure the effective protection of their rights. Therefore, we can ask ourselves whether the patient has the right to eHealth and how it is regulated.*

***Methods**: The survey presents and analyses the main legal instruments (laws and directives) governing the field of eHealth and patient rights in the Republic of Slovenia and the European Union. A brief description of the state of theoretical knowledge in the field of patient rights theory in relation to the field of eHealth based on the review of relevant literature is presented. By critically reading the legal instruments and literature, we assessed the level of legal regulation of the right to eHealth.*

***Results**: The right to eHealth in the Republic of Slovenia is not included in the patient rights catalogue regulated by the Patients' Rights Act. In the European Union law, Directive 2011/24/EU on the application of patients' rights in cross-border healthcare in the provision of Article 14 regulates the rules on the functioning of the voluntary eHealth network. The provision merely allows the convergence of EU Member States' regimes, which limits its scope and does not allow interpretations of the Directive towards a conceptualized, uniform, and fully applicable right to eHealth. In the current legal framework, therefore, we cannot talk about the operationalization of the right to eHealth, but merely on the accelerating measures of convergence of the Member States' regulations in the field of eHealth.*

***Discussion**: The right to eHealth can be developed from the point of view of theory as a creative concept. Basic elements of the right to eHealth, which can be the subject of future regulation, may include: access to eHealth services, effective protection of personal data in electronic form, effective cross-border availability of medical documentation (technical and semantic interoperability), education of users of eHealth services (e-literacy). The possible amendment of the Directive towards the right to eHealth would accelerate its enactment in the legal systems of the EU Member States.*

***Keywords**: rights, patient, eHealth, European Union, Republic of Slovenia*

Izvleček

***Uvod:** Kakovost in varnost zdravstvenih storitev je v vse večji meri odvisna od sodobne elektronske oziroma komunikacijske tehnologije. Procesi zdravstvene obravnave se morajo*

hkrati osrediniti na pacienta in zagotoviti učinkovito varstvo njegovih pravic. Zato se lahko vprašamo, ali ima pacient tudi pravico do e-zdravja in kako je le-ta urejena?
Metode: *Raziskava prikazuje in razčlenjuje glavne pravne instrumente (zakone in direktive), ki urejejo področje e-zdravja in pravice pacienta v Republiki Sloveniji in v Evropski uniji. Kratko je opisano stanje teoretičnih spoznanj na področju teorije pacientovih pravic v povezavi s področjem e-zdravja, ki temelji na pregledu relevantne literature. S kritičnim branjem pravnih instrumentov in literature smo ocenili stopnjo pravne urejenosti pravice do e-zdravja.*
Rezultati: *Pravica do e-zdravja v Republiki Sloveniji ni uvrščena v katalog pravic pacienta, ki jih ureja Zakon o pacientovih pravicah. V pravu Evropske unije Direktiva 2011/24/EU o uveljavljanju pravic pacientov pri čezmejnem zdravstvenem varstvu v določbi 14. člena ureja pravila o delovanju prostovoljne mreže e-zdravje. Določba zgolj omogoča zbliževanje ureditev držav članic EU, zaradi česar je njen domet omejen in ne dopušča razlag Direktive v smeri pojmovno dorečene, enotne in v polnosti aplikabilne pravice do e-zdravja. V obstoječi pravni ureditvi zato ne moremo govoriti o operacionalizaciji pravice do e-zdravja, ampak zgolj o pospeševalnih ukrepih zbliževanja ureditev držav članic na področju e-zdravja.*
Razprava: *Pravica do e-zdravja je mogoče z vidika teorije razvijati kot kreativni koncept. Med vsebinske elemente pravice do e-zdravje, ki je lahko predmet prihodnje zakonske ureditve, je npr. mogoče uvrstiti: dostopnost do storitev e-zdravja, učinkovito varstvo osebnih podatkov v elektronski obliki, učinkovito čezmejno dostopnost zdravstvene dokumentacije (tehnična in semantična interoperabilnost), izobraževanje uporabnikov storitev e-zdravja (e-opismenjevanje). Morebitna dopolnitev Direktive v smeri pravice do e-zdravja bi pospešila njeno uzakonitev v pravnih ureditvah držav članic EU.*

Ključne besede*: pravice, pacient, e-zdravje, Evropska unija, Slovenija*

Introduction

Within the member states of the European Union (hereinafter: the EU), including the Republic of Slovenia, the introduction of eHealth is an integrative part of the general reform of their health care systems. In 2012, the European Commission issues a new policy document, the eHealth Action Plan 2012-2020 - *Innovative healthcare for the 21st century,* that envisaged that actions related to eHealth should: 1. improve chronic disease and multimorbidity management and strengthen effective prevention and health promotion practices; 2. increase sustainability and efficiency of health systems by unlocking innovation, 3. enhance patient/citizen-centric care and citizen empowerment and encourage organisational changes; 4. foster cross-border healthcare, health security, solidarity, universality and equity; 5. improve legal and market conditions for developing eHealth products and Services (European Commission, 2012).

According to Chapman (1994), the reform of a health care system must also include a human rights approach. The reform of health care systems in the EU must also ensure the effective protection of patient's rights and freedoms. Thus, we can raise the main question of the

discussion, which reads as follows: do patients, beside other rights and freedoms, also have (or might have) the right to eHealth and how is it (or should be) regulated?

Although *omnis definitio in jure periculosa est*, there is hardly any other way than to start the discussion about legal rights perspective of eHealth with a question concerning its comprehensive definition. One of several noticeable efforts to get a comprehensive definition of eHealth was provided by Eysenbach, that claimed that »…e-health encompasses more than a mere technological development …« and defined the phaenomena of eHealth as follows: *»e-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology.«*(Eysenbach, 2001). Eysenbach tried to make this open-ended definition more precise by adding the 10 e's in »eHealth«: Efficiency of health care; Enhancing quality of care; Evidence-based e-health interventions; Empowerment of consumers and patients; Encouragement of a new relationship between the patient and health professional; Education of physicians through online sources and consumers; Enabling information exchange and communication; Extending the scope of health care; Ethics; Equity (Eysenbach, 2001). Later research (Pagliari, et al., 2005) found (in published scientific abstracts and Web-based information sources) 36 various definitions of eHealth, which had a significantly different scope and focus of the phaenomena.

It is not the task of our discussion to provide for a comprehensive and final definition of eHealth phaenomena, therefore the discussion will strive to show how its comprehension and articulation influences the process of legal regulation and the perspective of legal right(s) and/or freedoms that are or might be related to eHealth phenomena. Between the framework of legal norms and the scientific definition of eHealth, there is an ambiguous relationship. On the one hand, the scientific understanding and interpretation of eHealth influences the adoption and the content of legal regulation. On the other hand, the legal framework may determine (some) basic elements of a regulated subject matter – in this case of the phaenomena of eHealth – and provide for a more comprehensive definition of the regulated phaenomena.

Methods

The survey presents and analyses the main legal instruments (laws and directives) governing the field of eHealth and patient rights in the Republic of Slovenia and the European Union. Descriptive method of legal science was applied to present parts of primary and secondary law of the EU that is explicitly related to eHealth. Sources that do not refer to eHealth in explicit manner were not included in the research. We applied the same methodological approach to analyse the Slovene law. In the Slovene law, we examined the provision of the Constitution, of Health law and other statutes that are related to eHealth. With the use of comparative method of legal science, we were able to compare the most relevant provisions of the EU law with the provisions of the Slovene law. Because of paper's limitation, we decided not to discuss the legal

issues related to the consumers' protection and commercial law, which ought to be addressed separately.

Dogmatic method was used to briefly describe the state of theoretical knowledge in the field of patient rights theory in relation to the field of eHealth. By critically reading the legal instruments and literature, we first assessed the level of legal regulation of the right to eHealth. In the final part, we discussed the question of the legal nature of the potential legal right to eHealth.

Results

The phaenomenon of eHealth as a subject of legal regulation is mostly affected and determined by the legal framework of the European Union law and of the Slovene law. We shall first discuss the main characteristics of the former.

European Union Law

The competences of the EU in respect of the protection of public health are first determined by the Treaty on the Functioning of the European Union (hereinafter: the TFEU). The provision of Article 168 TFEU ensures a high level of human health protection in the definition and implementation of all Union policies and activities. On the one hand, most competences of the EU concerning public health are complementary. In principle, EU member states have primary responsibility regarding the definition of their health policy, the organisation and manner of delivery of health services and medical care. Thus, Union actions may complement national health care policies, if they are directed towards common goals (e.g. improvement of public health, prevention of physical and mental illness and diseases, obviation of sources of danger to physical and mental health). Under Article 168 TFEU, the EU also has the competence to encourage cooperation between the Member States, it may lend support to actions of Member States, and it may enhance cooperation between the Member States to improve the complementarity of their health services in cross-border areas.

On the other hand, the provision of Article 168 TFEU also provides for stronger legislative competences, if they are motivated by common safety concerns and represent: 1. measures setting high standards of quality and safety of organs and substances of human origin, blood and blood derivatives (these measures shall not prevent any Member State from maintaining or introducing more stringent protective measures); 2.measures in the veterinary and phytosanitary fields, which have as their direct objective the protection of public health; and 3. measures setting high standards of quality and safety for medicinal products and devices for medical use (Para. 4/ Points a, b and c).

Objective tasks (policies) of the EU, enshrined in Articles 168 and 114 TFEU (harmonization measures for approximation of laws) must be interpreted in the light of the provision of Article 35 of the Charter of Fundamental Rights of the European Union (hereinafter: the Charter), which enshrines the right to health care and reads as follows: »Everyone has the right of access to preventive health care and the right to benefit from medical treatment under the conditions established by national laws and practices. A high level of human health protection shall be

ensured in the definition and implementation of all the Union's policies and activities. « In addition, the provision of Article 34 of the Charter, which assures social security and social assistance, must be observed respectively.

Articles 114 and 168 TFEU were the basis for the adoption of the Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare (hereinafter: the Directive 2011/24/EU), which in the provision of Article 14 regulates eHealth by giving the EU the competence to »… support and facilitate cooperation and the exchange of information among Member States working within a voluntary network, connecting national authorities responsible for eHealth designated by the Member States…« (Para. 1). Article 14 of the Directive 2011/24/EU established and determined the objectives of the voluntary eHealth network, which reads as follows: »(a) work towards delivering sustainable economic and social benefits of European eHealth systems and services and interoperable applications, with a view to achieving a high level of trust and security, enhancing continuity of care and ensuring access to safe and high quality healthcare; (b) draw up guidelines on: (i) a non-exhaustive list of data that are to be included in patients' summaries and that can be shared between health professionals to enable continuity of care and patient safety across borders; and (ii) effective methods for enabling the use of medical information for public health and research; (c) support Member States in developing common identification and authentication measures to facilitate transferability of data in cross-border healthcare…« (Para. 2). The Directive 2011/24/EU demands that principles of data protection in the EU law must be respected (as determined in the Directives 95/46/EC and 2002/58/EC; *ex ante* in the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

Finally, the Directive 2011/24/EU also obliged the Commission to adopt necessary measures for the establishment, management, and transparent functioning of the eHealth network (Article 11 Para. 3). In the eHealth Action Plan 2012-2020, the Commission set out the main operational objectives, which aim: to achieve wider interoperability of eHealth services; to support research, development and innovation in eHealth and wellbeing to address the lack of availability of user-friendly tools and services; to facilitate uptake and ensure wider deployment; and to promote policy dialogue and international cooperation on eHealth at global level (Commission, 2012).

Slovene Health Law

The Constitution of the Republic of Slovenia (hereinafter: the Constitution) guarantees the right to health care in the Article 51, which reads as follows: »(1) Everyone has the right to health care under conditions provided by law. (2) The rights to health care from public funds shall be provided by law. (3) No one may be compelled to undergo medical treatment except in cases provided by law.« The provision of Article 51 Constitution is closely connected with the provision of Article 50 Constitution that ensures the right to social protection. It is up to the Legislator to enact detailed legal rules in the area of Health law and to harmonize them with

the EU law. Observance of constitutional provision on personal data protection (Article 38 Constitution) and on free enterprise (Article 74 Constitution) is also important when providing (e)health services.

Under Article 1 of the Personal Data Protection Act sensitive personal data (that also include the health status of the individual) may, *inter alia*, only be processed if they are processed by health-care workers and health-care staff in compliance with statute for the purposes of protecting the health of the public and individuals and the management or operation of health services.

Only one part of the Slovene health law was renewed due to the harmonization requirements arising from the Directive 2011/24/EU. In June 2015, the National Assembly supplemented the Healthcare Databases Act (hereinafter: the HD Act). The main change of the HD Act was related to a new definition of medical records. In addition, the Chapter VI (Articles 14-14d) of the HD Act defined eHealth as a harmonized health information system that operates at national level, and which - within the uniform information and communication infrastructure – enables processing of health and other data, and guarantees the provision of eHealth services, which by electronic means allow the processing of data for the purposes specified in the individual eHealth database. The eHealth databases are the Central Patient Data Register (hereinafter: the CRPP) and data records that are established for the provision of individual eHealth services (the bill provides for 8 different data records, e.g. ePrescription, eDoctor's note, TeleStroke). The National Institute of Public Health bears the responsibility for executing tasks in the domain of eHealth.

The Health Care Act (hereinafter: the HC Act) was supplemented in November 2017 to enable provision of telemedical eHealth services. According to Article 3/3HC Act, telemedical healthcare activity presupposes that the patient and the provider (or several providers) of health care are spatially separated and deliver the healthcare service by using information and telecommunication technologies. Such healthcare activity is allowed, if it is in accordance with the accepted medical doctrine. If this is the case, medical documentation has to be provided in accordance with the rules on the protection of personal data relating to the transmission of sensitive personal data through telecommunication networks. When performing medical activities *via* telemedicine, healthcare is deemed to be provided in the country in which a healthcare provider is carrying out telemedical health service.

Now, the Slovene Personal Data Protection Act is being revised to harmonize with the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC. At the end of 2017, a draft of the new Personal Data Protection Act was published in the public consultation procedure that would lead to the final draft of the bill.

Noticeably, nor the eHealth related activities and tasks of the Slovene health authorities neither the explicit right to eHealth have been included in the patient rights and freedoms catalogue regulated by the Patients' Rights Act (hereinafter: the PR Act). However, it would be a mistake

to claim that eHealth services are not related to the catalogue. Some services of eHealth, e.g. TeleStroke, are provided in the scope of urgent medical treatment. eHealth services as a rule provide for a wider and more equal access to preventive and curative healthcare services. They are a subject of patient's right to freely choose the provider of health care services (Article 9 PR Act). eHealth services might be provided as operationalization of patient's right to appropriate, safe, and qualitative health services (Article 10 PR Act). The HD Act provides that some patients' decisions, which were made in accordance with the PR Act, must be (Article 14b/4/1/p point) inserted in patients' medical records.

Discussion

Both, the European Union Law and the Slovene Health Law regulate the phenomena of eHealth services in a restrained way and they do not construct a special right to eHealth services. Access to eHealth services, which are rapidly developing, is a matter of other constitutional and statutory rights and freedoms. Two questions emerged during the discussion; one is related to the problem of appropriate definition of the eHealth phenomena, the other opens a dilemma, whether eHealth may be a self-supporting subject of a legal right.

Definition(s) of eHealth

Beside definitions of eHealththat were mentioned above (see Introduction), one should also mention a pragmatic, but still broad definition accepted by the European Commission, which defines eHealth as: »… the use of ICT in health products, services and processes combined with organisational change in healthcare systems and new skills, in order to improve health of citizens, efficiency and productivity in healthcare delivery, and the economic and social value of health. eHealth covers the interaction between patients and health-service providers, institution-to-institution transmission of data, or peer-to-peer communication between patients and/or health professionals« (European Commission, 2012). The Slovene Law narrows the definition of eHealth, which only relates to the harmonized health information system. Broad definitions make legal regulation difficult and dispersed. Narrow definitions run the risk to overlook important aspects of the regulated phaenomena.

In addition, Black et al. (2011) report that empirical evidence for the beneficial impact of most eHealth technologies is often absent or very modest. This means that we do not have sufficient empirical knowledge about the regulated phenomena of e-Health, which makes the task of defining it even more difficult.

eHealth as subject of legal right

Whether a person (a legal subject) in a system of law is entitled to a subjective right is a question of legal dogmatics (Alexy, 1994). In the European Union law, the Directive 2011/24 / EU on the application of patients' rights in cross-border healthcare in the provision of Article 14 regulates the rules on the functioning of the voluntary eHealth network. The provision merely allows the convergence of EU Member States' regimes, which limits its scope and does not allow interpretations of the Directive towards a conceptualized, uniform, and fully applicable right to eHealth. In the current legal framework, therefore, we cannot talk about the

operationalization of the subjective right to eHealth, but merely on the accelerating measures of convergence of the Member States' regulations in the field of eHealth. According to Alexy (1994, p.171), we can distinguish three positions of »rights«: rights to something (»Rechte auf etwas«), freedoms (»Freiheiten«) and competences (»Kompetenzen«). The discussion showed, that – in the current legal framework of Slovenia and EU – eHealth services are more related to the new procedural (or operational) way – based on the use of IT technology – in which health care services are provided, than to a (substantially) new set of (e)health care services.

Conclusion

The right to eHealth can be developed from the legal theory point of view as a creative concept, which could determine which eHealth services have to be assured as a right to something (e.g. TeleStoke), which as freedoms (e.g. negative freedom concerning the protection of personal health data or a patients' positive freedom to choose a health care provider), and which aspects relate to competences of public authorities (positive obligations of the state). Heterogeneous elements of the right to eHealth, which can be the subject of future regulation, may (or already) include: access to eHealth services, effective protection of personal data in electronic form, effective cross-border availability of medical documentation (technical and semantic interoperability), education of users of eHealth services (e-literacy). The possible amendment of the Directive 2011/24 / EU on the application of patients' rights in cross-border healthcare towards the right to eHealth would accelerate its enactment in the legal systems of the EU Member States. Enabling citizen's secure access to and use of health data across-borders, supporting a cross-border data infrastructure to advance research and personalised medicine, and facilitating feedback and interaction between patients and health care providers, supporting citizen empowerment, are three priorities for EU actions that the Commission identified in the mid-term review of the Digital Single Market strategy (Commission, 2015). If eHealth services are interpreted as being part of the Digital Single Market, then the impetus for legal harmonization could be much stronger. Better definition and renewed legal regulation of eHealth services might enable us to better cope with the changing environment, conditions or culture of accessing the health care services.

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USE OF WEBSITES IN HEALTH EDUCATION OF ADOLESCENTS WITH SPECIAL NEEDS

UPORABA SPLETNIH STRANI PRI ZDRAVSTVENI VZGOJI MLADOSTNIKOV S POSEBNIMI POTREBAMI

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Abstract

Introduction: *Adolescents with special needs experience several risk factors for the development of mental health conditions. Healthy lifestyle is an important factor for strengthening their protective factors and resistance. Nowadays, young people have an easy access to digital technology. They can quickly find web information, but often trust it without critical appraisal. Adolescents with special needs can be hindered in their search for online information for various internal and external reasons (problems in reading and writing, severe forms of visual impairment and blindness, disturbance of attention, disruptive behaviour, etc.). Websites about health education are usually less accessible to adolescents with special needs. The survey aimed to determine how youngsters with special needs choose online information about healthy lifestyles, how useful the websites are and how effective they are in promotion of healthy lifestyles.*

Methods: *For the purposes of the study, a qualitative research method was used, with a sample of four adolescents with special needs. The objective of the study was also to specify the frequency and the users' manner of search for online information on healthy lifestyle. We used triangulation technique of data collection, unstructured observation and interview, and analysis of online information.*

Results: *All four adolescents with special needs had problems with choosing keywords in a web browser. They did not check the list of hits. The information was selected in the order shown in the list of hits. The adolescents chose information on healthy lifestyles uncritically, they did not check the website's sources. The choice of websites was influenced by the pictorial material accompanying the texts, the different sizes and colours of the font, and the larger font size in the text.*

Conclusion: *There are up to 20% of young people in the population with various special needs, which hinder acquisition of specific skills. When designing web pages, we recommend the multifaceted provision of information (pictures, recording, sound, colours, different text sizes, larger font size, reference points, highlighted keywords). We also suggest that professional and scientific online information about health education is placed among the first hits of the web browser.*

Keywords: *adolescents with special needs, health education, healthy lifestyle, Information and Communication Technologies*

Povzetek

Izhodišče: *Mladostniki s posebnimi potrebami imajo več rizičnih dejavnikov, ki lahko napovedujejo težave v duševnem zdravju, zato je preventiva zdravega življenjskega sloga pomemben dejavnik pri krepitvi njihovih varovalnih dejavnikov in rezilientnosti. Danes je mladim dostopna digitalna tehnologija tako rekoč na vsakem koraku. Mladi se hitro zadovoljijo s spletnimi informacijami in jih ne kritično uporabljajo. Mladostniki s posebnimi potrebami lahko neučinkovito berejo spletne informacije iz različnih notranjih in zunanjih vzrokov (težave v branju in pisanju, hujše oblike slabovidnosti in slepota, motnje pozornosti, motnje izvršilnih spretnosti,...). Spletne strani o vsebinah zdravstvene vzgoje so mladostnikom s posebnimi potrebami običajno slabše dostopne. V raziskavi nas je zanimalo, kako mladostniki s posebnimi potrebami izbirajo spletne informacije o zdravem življenjskem slogu, koliko so spletne strani uporabne in kako učinkovite so pri spodbujanju zdravega življenjskega sloga mladostnikov s posebnimi potrebami.*

Metode: *Opravljena je bila kvalitatitivna raziskava, s katerim smo ugotavljani pri štirih mladostnikih s posebnimi potrebami, koliko pogosto in kako iščejo spletne informacije o zdravem življenjskem slogu. Uporabili smo triangulacijsko tehniko zbiranja podatka, nestrukturirano opazovanje in intervju ter analiza spletnih informacij.*

Rezultati: *Vsi štirje mladostniki s posebnimi potrebami so imeli težave pri izbiri ključnih besed v elektronski brskalnik. Seznama zadetkov niso preleteli. Informacije so izbirali po vrstnem redu, kot so bili podani v seznamu zadetkov. Mladostniki so informacije o zdravem življenjskem slogu izbirali nekritično, avtorjev spletnih strani niso preverjali. Pri izbiri spletnih strani odločilno vplivajo slikovna gradiva ob besedilih, različne velikosti in barve pisave ter večja velikost pisave v besedilu.*

Ugotovitve: *V populaciji je do 20 % mladostnikov, ki ima različne posebne potrebe, zaradi katerih imajo ovire pri učenju znanj in spretnosti. Pri oblikovanju spletnih strani priporočamo veččutno podajanje informacij (slika, posnetek, zvok, barve, različne velikosti črk v besedilu, večje črke v besedilu, oporne točke, poudarjene ključne besede). Priporočamo, da se strokovne in znanstvene spletne informacije o zdravstvi vzgoji postavi na prva mesta v seznamu zadetkov spletnega brskalnika. Večjo moč imajo informacije, ki so podane na začetku seznamov zadetkov iskalnega pojma.*

Ključne besede: *mladostniki s posebnimi potrebami, zdravstvena vzgoja, zdrav življenjski slog, informacijsko-komunikacijska tehnologija, IKT pismenost*

Introduction

According to the World Health Organization report in 2017, approximately 15% of the world population suffer from one or more disabilities (hereinafter *special needs*), however, these data do not include their "hidden" deficiencies and hindrances. These disabilities encompass mental

health disorders, hearing impairment or hearing loss, blindness or visual impairment, speech disorders, long-term health conditions, physical disability and deficiencies in individual areas of learning, autism and emotional or behavioural disorders (ZOUPP, 2011). The data available indicate that up to 20% of the population need help, support and adjustments for equal participation in society. Successful integration of people with special needs through various forms of support and adjustments enables them to lead an independent life, to have positive self-perceptions, to participate and be part of a larger society.

People with special needs are more likely to seek health information and use health services than healthy population. They encounter various obstacles in modern e-Health services. Information and communication technology (ICT) plays an important role in people's lives in modern society. It increases the quality of life for people with special needs. Many people with special needs need supportive technology for communication and equal participation in society (Tabaj, et al., 2010). As Bagon (2015) reports, many ICT researchers emphasize a positive impact of ICT on communication, social and cognitive development of people with special needs. In his report (p.2), he emphasizes that the main goal of an inclusive society is to create environments that are appropriate and adapted to people with special needs with different abilities, capabilities, skills and knowledge. However, there is still a lack of research on the kind of computer and information competences people with special needs possess, how and where they acquire their ICT competences, and how to design websites that will enable them to have equal access to the information desired.

The aim of the study was to establish the level of computer and information literacy in four adolescents with special needs, and to identify the problems they encounter in searching for information on the websites. The data were obtained with practical tests, which were structured according to the research objectives.

The purpose of the study was also to draw attention to the poor computer and information literacy of adolescents with special needs and their problems in finding information via web browser. The case presented is a preliminary study for further research in the field of ICT literacy for people with special needs.

Methods

A qualitative research using the case study method was used (Yin, 2009; Starman, 2013). We selected a singular study of a particular case. Purposive sampling or a non-probability sampling method was used. Four adolescents with special needs, attending the final triad of elementary school (eighth and ninth grade) were included in the study. We identified their special needs on the basis of the Commission's Expert Opinion on Guidance for Children with Special Needs. The participants experienced deficits in the following areas of learning: (1) deficiencies in reading and writing, i.e. dyslexia, (2) the coexistence of deficits in the field of movement coordination, i.e. dyspraxia, and speech disorders, (3) coexistence of deficits in the field of attention, (ADHD), i.e. attention deficit with hyperactivity disorder and dyslexia and (4) attention deficit and hyperactivity disorder. The average age of adolescents was 14 years, three of them were male.

The survey tried to determine how the adolescents with special needs use the on-line health and medical information as well as information on a healthy lifestyle. Their computer and information literacy was assessed along with their understanding of information about healthy lifestyle found on the websites. In the assessment, the following statements and questions were used: (1) You have developed a rash on the face that is turning into unusually large pimples. What are you going to do? Where will you get the useful information on what is happening to your body? (2) You need a medical examination because of the unusual rash and pimples on your face, which have lasted for two weeks. How will you get to the doctor? What will you do online to find out how to get to the doctor? (3) Your doctor warns you about the importance of caring for a healthy lifestyle. What did he mean by that? (4) In the school subject *health education*, you have to prepare a project on a healthy lifestyle and what lifestyle you lead in caring for your health. How will you prepare for the project? How will you find the information about a healthy lifestyle on the internet?

The data were collected through observation with participation and unstructured interviews. The indicators and criteria for the evaluation of computer and information literacy with the checklist were prepared in advance. The e-HEALS questionnaire (Norman and Skinner, 2006) was then used to measure the participants' self-assessment of their knowledge and skills in searching, evaluating and using the online information for solving their health problems. Triangulation method (Lobe, 2006) was employed to determine the participants' current shortcomings in the field of computer and information competences through research samples. The participants' performance was observed with the aim to determine their ability to properly understand the health information, and to identify any obstacles when reading the online information.

Results

The following table (Table 1) shows the computer and information competences related to e - Health for four adolescents with special needs and the obstacles encountered when reading online health information.

The Table 1 presents the data about the skills of using a computer to obtain information about a healthy lifestyle. The participants were able to properly use the computer devices. They did not need any adaptive computer equipment. They were not competent in touch typing, which was recommend by a specialist teacher to overcome deficits. Three participants were disturbed by a too bright background of the computer screen, causing visual interference. The brightness and colour of the screen were adjusted to their needs. Only one adolescent used the screen ruler and the customized font size on his personal computer at home. All the participants were able to access the websites. Three participants needed help with the proper selection of keywords for data searches.

Table 1. Computer and Information Competences and Obstacles in Reading Online Health Information for Four Adolescents with Special Needs. E-HEALS questions are evaluated: 1 - I completely disagree, 2 - I partly disagree, 3 - I neither disagree nor agree, 4 - I partly agree, 5 - I completely agree. The total sum of all possible answers is 40; the total score in the questionnaire shows the level of perception of digital e-Health literacy. We determined that 8-10 is a weak level of perception of digital e-Health literacy, 11-20 moderate perception, 21-30 good perception and 31- 40 excellent perception of digital e-Health literacy.

Computer and Information Competences	1	2	3	4
Uses the computer in the cabinet without inviting and guidance (can turn it on and independently accesses the website).	yes	yes	yes	yes
Uses customized computer equipment (keyboard and mouse).	no	no	no	no
Touch typing ability.	no	no	no	no
Disturbed by the colour and brightness of the screen background.	yes	no	yes	yes
Can change the brightness and colour of the screen background.	no	no	no	no
Uses adaptations for reading online information (support software: voice e-reader, e-speaker, screen reader, colour transparency, screen ruler, etc.).	sometimes	no	no	no
Would need the support software to summarize texts.	no	yes	yes	yes
Needs customized font size.	yes	yes	yes	yes
Uses customized font size.	no	no	no	no
Is able to access the Google site himself.	yes	yes	yes	yes
Selects keywords properly for data searches and does it independently.	partly	no	no	no
Collects information and searches with a quick overview of texts (looking for a definition of a healthy lifestyle, what contents belong to a healthy lifestyle: nutrition, sleep, exercise, habits, mental health, how to manage stress, etc.).	yes	no	yes	no
Critically evaluates health information (assessing and evaluating the usefulness of health information to solve health problems).	yes	no	no	no
Checks authors and organization of the website.	no	no	no	no
Shows difficulties in understanding online information due to unadjusted design of the websites for his specific needs.	yes	yes	yes	yes
Knows the name and surname of his/her personal doctor.	yes	no	no	no
Knows the place of work of his/her doctor.	yes	no	yes	no
Is able to find a healthcare facility online, where his/her personal doctor works.	yes	no	no	no
He/she can find a website with a list of doctors in a health institution.	yes	no	no	no
Finds a personal doctor, his place of work and his working hours.	yes	no	no	no
Finds how to make a booking online.	yes	no	no	no
Makes an appointment for a medical exam at his/her personal doctor (sends an e-mail and in a few sentences describes his health problem).	yes	no	no	no
e-HEALS: Knows what sources of health information are available on the World Wide Web.	4	1	2	2
e-HEALS: Knows where to find reliable health information on the World Wide Web.	3	1	1	1
e-HEALS: Knows how to find useful health information on the World Wide Web.	3	1	1	1
e-HEALS: Knows how to use the World Wide Web to find answers to health questions.	4	2	3	3
e-HEALS: Knows how to use the health information he finds on the World Wide Web.	3	2	3	2
e-HEALS: Has the skills needed to evaluate the sources of health information he finds on the World Wide Web.	4	1	2	1
e-HEALS: Has the skills needed to evaluate the sources of health information he/she finds on the World Wide Web.	5	2	3	2
e-HEALS: He/she is confident in using the information he/she finds on the Internet to make health decisions.	3	3	3	3

When collecting health information, two participants experienced significant problems. They needed additional instructions to understand the concept of a healthy lifestyle and what a healthy lifestyle includes. They also had difficulty in recognising the key facts about a healthy lifestyle (at least half-an-hour exercise every day, five meals per day, sufficient fruit, vegetables, carbohydrates, fats, sugar, enough sleep of at least eight hours per day, less salt, etc.). The use of skills and knowledge on the e-Health website (finding/searching for a personal doctor, getting information about the doctor's working hours, booking an appointment online and briefly presenting your health problem) has proved to be inadequate in three adolescents, which indicates their inactive role in their health care. Three adolescents did not know the name of their personal doctor, nor did they know the doctor's place of work or clinic. When they had health problems, all the participants turned to their parents, who provided for their proper health care. The participants also never checked or critically evaluated the obtained information. They reported that they had never been taught to critically appraise the information sources and the information found.

All the participants had difficulty in understanding health information online for the following reasons: the information abundance, useless texts, problems with reading and comprehension, problems in maintaining attention and concentration while reading longer texts about a healthy lifestyle. The key issues were difficult to discern and there was not enough visual material. The participants expressed their preference for obtaining health information via video clips.

According to the e-HEALS questionnaire (total scores of 13, 18, and 15 points), the digital health literacy of three participants was moderate and one participant demonstrated fairly high health literacy level (29 points). The participant who perceived his digital health literacy as good was also well aware of high-quality and reliable health information on the Internet. He could distinguish it from low-quality data, primarily by the author and its occurrence in different sources. He claimed that more reliable information is available on the website "Vizita" and "Med.over.net", where doctors give answers to health issues, or on the "IVZ" website. Other participants did not know where to find reliable and useful health information online. The participating youngsters can not make decisions about their health on the basis of information found online. They reported they often become even more indecisive and confused, so the information found is checked by their parents. It is their parents who take responsibility for their health and decide when they should get medical help.

Discussion

The rapid development of ICT has a significant impact on changes in education as well as on daily activities, tasks and leisure time. People with special needs are more likely to encounter obstacles when accessing and using ICT, so ICT should be accordingly customized. In Slovenia, the knowledge regarding the use of modern ICT by people with special needs is still insufficient. People with special needs have limited possibilities of using ICT and other online services. There is a lack of professional staff who could use adapted or customized ICT and educate people with different forms of disabilities as well as personalized forms of ICT (Tabaj, 2010). In the field of health education, the development of digital health literacy is especially important. Special attention should be paid to early introduction of digital education also to

vulnerable groups of the population, including persons with special needs. The rapid development of digital technologies in healthcare often causes problems for these vulnerable groups, thus reducing the equality of their access to health information online. People with special needs need personalized ICTs, such as personalized keyboard and mouse, reading software, listening aids, displaying text, converting texts into sign language and subtitles for the deaf and hearing impaired people, Braille Blind Tools, etc., which provide equal access to online information (Gorjanc-Basaj and Čufar, 2007; Tabaj, 2010).

Most ICT adaptations are made to support the users with sensory or physical limitations, but less for those with "hidden" deficits, such as dyspraxia, dyslexia, attention deficit and hyperactivity, or other intellectual deficits. After reviewing various surveys on the use of personalized ICT for people with reading and writing deficiencies, L. Cidrim and Madeiro (2017) recommend appropriate choice of fonts and font size (e.g. Open Dyslexic font 20), fewer words per line, greater line spacing as well as colour change of the screen. These adaptations may reduce reading errors and increase reading speed, as well as facilitate better understanding and remembering. In several countries abroad, there is availability of user interface design, software, phonological and multisensoric sources, and technological tools (e.g. Easy Lexia 2.018, ABRA 5, e-Pearel 5, Phonics Alphabetization13, e-reader to convert text to speech) to overcome the shortcomings in the field of reading and writing, spelling problems, phonological awareness, spelling rules, memory and mathematics. The same source reports that these tools are efficient and useful in improving the function of meta-cognitive reading and writing skills. Such text adaptations on web pages will also allow the normal population to read and write texts better and faster, and it is worthwhile to consider them already at the time of designing the websites (Witt and McDermott, 2004).

Due to continuing growth of inaccurate health information on the worldwide web and the users' meagre information-evaluation skills, it is necessary to teach children and adolescents how to search for accurate information and critically evaluate the contents. It is recommended that more emphasis be laid on information quality, the source credibility and health information-seeking behaviour of users.

Conclusion

An appropriate form of ICT is a key tool for promoting the equal possibilities of access to information and inclusion of people with disabilities in the society. People with special needs are more likely to encounter obstacles when using ICT, so it is important to encourage and teach the persons with special needs to take an active role in understanding online information about health and a healthy lifestyle as early as possible. A great deal of health information is unreliable and inaccurate, so people with special needs need to learn how to critically assess the quality of health information online, and distinguish between reliable and unreliable information. The adolescents should learn what information and which websites are professionally and scientifically reliable. This is especially important in digital health education of young people with special needs. Tailoring of ICT to their needs is necessary to facilitate their understanding and critical assessment of online information on healthy lifestyle and health.

The website designers should create such "online environments" which will enable different people, including people with special needs and the elderly, to effectively use the online information, taking into consideration their abilities, skills and knowledge. Adequate websites designing also opens new possibilities for the people with special needs for more independent life and better social inclusion, social justice in health information seeking, positive self-perception, security and acceptance in society. Adjustments for people with special needs should be planned at the very beginning of preparing and designing the websites.

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Plenary paper

TO WHICH EXTENT IS ONLINE HEALTHCARE A POSSIBLE REALITY?

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Abstract

While at a much slower pace, the adoption of IT in healthcare systems has, in general, followed the same direction as other industries. In the future, we expect a fully integrated healthcare IT system based on real patient needs. Patients are increasingly more comfortable with using digital networks and services, not only for minor consultations but even for complex and sensitive issues. Healthcare systems need to follow with reorganization to serve patients' expectations and provide not only better healthcare delivery but also better user experience.

Key words: *healthcare system, digitalization, IT, patient*

Introduction

The development of IT in healthcare systems has, in general, followed the same direction as the development of IT in other industries. At the beginning in the 1950s, IT was used to automate highly standardized and repetitive tasks. The need for IT systems was driven by the need for an efficient billing of medical services, causing the design of solutions to be focused on digitizing existing workflows. Patient needs were overlooked as the main use of IT in healthcare was vast amounts of statistical data processing.

In the second wave, twenty years later, IT helped integrate parts of core processes. The patient, who should have been in the centre of healthcare and IT systems design, was again overlooked!

A review of the use of telemedicine shows that solutions in the first two waves were mostly linking health professionals. Rare exceptions were connecting professionals directly to patients.

Deciding factors, which hinder or support implementation, can be clustered into four categories: legal, sustainability, cultural and contextual factors.

IT and mobility

Digital services are heavily used in banking, transportation, shopping and other areas of everyday life. In contrast, the level of convenience of technology is has only slowly been introduced and implemented in healthcare.

The biggest potential and goal of telemedical solutions is to bring convenience to patients. The 2017 U.S. Telemedicine Industry Benchmark Survey (REACH Health, 2017) showed the top three objectives driving health organisations in the US to develop telemedicine programmes, which are: improving patient outcomes, increasing patient engagement and improving patient convenience. 55% of the 436 respondents in the survey (healthcare executives, physicians, nurses and other professionals) estimated that they are highly successful in improving patient convenience with telemedicine, 52% estimated that they are improving patient outcomes highly successfully. (REACH Health, 2017).

Remote care

A team of researchers from the Jefferson College of Population Health, Philadelphia, Pennsylvania conducted a systematic literature review of 347 articles to identify key trends associated with remote patient monitoring via noninvasive digital technologies over the last decade (Vegesna, et al., 2017).

The trends indicate the rise of multicomponent interventions, followed by smartphones/PDA, wearables, biosensor devices, and computerized systems. Another key trend was monitoring of chronic conditions, including respiratory, weight management, metabolic, and cardiovascular diseases. Although substantial diversity in health-related outcomes was noted, studies predominantly reported on the positive contribution of these tools.

The main risks endangering health and safety of patients when provided with solutions enabling them higher mobility are complications requiring follow-up care, discontinuity of care caused by failure to coordinate medical documentation, and incomplete information preventing informed decision-making.

Advances in electronic communications have enabled patients to be diagnosed in one country and treated by health professionals in another country through means of telemedicine. The biggest systematic review of cross-border healthcare conducted included 94 papers on the use of telemedicine to deliver cross-border healthcare and identify the factors that hinder or support its implementation (Saliba, Legido-Quigley, et al., 2012). They involved 76 countries worldwide, most involving collaborations between high and low or middle-income countries. Most described services delivering a combination of types of telemedicine but specialties most represented were telepathology, telesurgery, emergency and trauma telemedicine and teleradiology. Most link health professionals, with only a few linking professionals directly to patients. The main driver for the development of cross-border telemedicine is the need to improve access to specialist services in low and middle-income countries and in underserved rural areas in high-income countries. Factors that hinder or support implementation can be clustered into four main themes: legislation, sustainability, cultural and contextual factors.

The financial sustainability of telemedicine still remains a critical issue, regardless of the rapid decline in the cost of technology over the last few years. Technology is getting cheaper, however, sustainability carries implementation and adoption costs, and costs of technical maintenance. In any case, these are outweighed by personnel and management costs (Aavikso, Kruus, 2013). More than financial sustainability, the common key barrier to wider adoption is the acceptance of technology-based solutions that would promote remote health care services by staff members. As technological solutions are often not yet integrated into national health systems in terms of reimbursement, the staff members are only partially attracted to them (mostly in the pilot or externally financed projects).

When supporting patient mobility, informatization and digitalization even further gain in importance as more data are moved across the borders with patients. The first challenge is linked to the level of digitalization. There are big differences in levels of digitalization among different countries, especially regarding the infrastructure as one of the main obstacles.

Standards

While regarding information technology issues as challenges, it is important to stress that technology per se cannot be an obstacle. Technology is used in all other sectors and there are successful international IT projects in almost all industries. Healthcare remains one of the last non-integrated sectors. Standards, as well, are not a problem as standards are defined in medicine informatics (HL7, IHE, FHIR, openEHR) and define interoperability and exchange of data, security, terminology dictionaries and protocols for authorization, identification and authentication of patients. Patient engagement (Hibbard, Greene, 2013) is an increasingly recognised as a key component of strategies to reform health care. Patients want to be active in the healing process, they want to have access to their medical records and want to understand how treatment is planned, what are the upcoming activities and triggers for next steps in the healing process. Patient portals (Emont, et al., 2011) can offer important benefits to patients and provider organizations.

Portals in healthcare cannot be used in all situations and cannot cover all treatment procedures. Patient portals (Kruse, et al., 2015) seem to offer enormous potential for higher quality care, but it is unknown whether providers, who offer the portals will be able to capitalize on the Meaningful Use, stage 2 incentive due to lack of awareness of the patient portal service.

Future

One of the important reasons slowing down transition to wider telemedicine availability and usage lies in the age structure of the population. The elderly, who need most healthcare services, are least tech-savvy and are averse towards the use of technological services. The study on virtual visits and patient-centred care in Canada (McGrail, et al., 2017), where virtual visits have been publicly funded since 2012 showed that younger patients and physicians were more likely to use and provide virtual visits compared to older and sicker patients who were more likely to see a known provider.

Further reasons for slow implementation come from legal, financial, organizational and political factors. For example, the end user, the patient, is far from the decision makers on price and design of IT systems in healthcare institutions. In public systems, the decision maker around these issues might not even be the healthcare provider, but the government. EHealth development is often dependant on national strategies and governmental budgets. On top of that, healthcare data are the most sensitive personal data, encouraging high caution and strict legal requirements on how data can be collected, stored and shared. The latter is becoming an increasingly pressing problem. According to Accenture (2017), 5 percent of patients will be impacted by healthcare provider data breaches between 2015 and 2019. According to their calculation, that amounts to more than 6 million people in the US becoming victims of medical identity theft. 16 percent of impacted patients—more than 4 million people—will be victimized and pay out-of-pocket costs will total almost $56 billion over the next five years.

In the third wave of IT adoption, we expect full digitization of entire enterprises, including digital products, channels, and processes, as well as advanced analytics that enables entirely new operating models. As in other industries, blockchain technology is entering the healthcare sector. In combination with cryptocurrencies it is bringing new solutions for managing insurance premiums, billing in healthcare, access to healthcare, population health, medical records, patient-generated data and more.

"*At its core, blockchain offers the potential of a shared platform that decentralizes health data, ensuring access control, authenticity, and integrity of protected health information. Further, the blockchain-based distributed network consensus with cryptography techniques provides an additional layer of trust to minimize cybersecurity threats for healthcare IT systems. This never-before blockchain-based trusted workflow with a "single source of truth" presents the healthcare industry with radical new possibilities for outcome-based care delivery and reimbursement models".*

(Frost and Sulivan, 2017)

Patients all around the world have grown more comfortable using digital networks and services, even for complex and sensitive issues. As noted by Frost and Sulivan (2017), increasing pricing pressure to decrease healthcare cost globally and digitization of care delivery models are transitioning the industry toward a much-anticipated personalized treatment paradigm and value-based care.

We should focus on what patients really want from digital healthcare and then organize services according to estimated patient demand, the value created through the services and needed investments. And finally, just like organizations in other industries, healthcare companies should continually add new services to keep patient attention and build value.

Digitalization has no borders, let us it to overpass borders in health for health and well-being of all!

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THE ATTITUDES OF SERBIAN NURSES TOWARDS COMPUTERS IN HEALTHCARE

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Abstract

Introduction: *The implementation of hospital information systems in Serbia started in 2012 in the form of a project conducted jointly by the Ministry of Health and the European Union. The successful implementation of hospital information depends not only on equipping hospitals with new information technology, but also on the involvement of all healthcare professionals, in particular nurses as frontline care providers. If nurses do not use computer technologies, nursing practices will not be integrated into patient electronic health records in accordance with the nursing process, which in turn, could impact the quality and safety of patient care. Therefore, the aim of this study was to identify the attitudes of Serbian nurses towards the use of computers in healthcare and factors influencing their attitudes.*

Methods: *Descriptive, analytical cross-sectional study was conducted in two university hospitals on a sample of 203 nurses. The instruments used in this research included the Pretest for Attitudes Towards Computers in Healthcare Assessment Scale v. 3 for the assessment of nurses' attitudes, the computer literacy questionnaire for the assessment of the ability to use a computer and a socio-demographic questionnaire.*

Results: *The internal reliability of The Pretest for Attitudes Towards Computers in Healthcare Assessment Scale was acceptable ($\alpha = 0.92$) and the overall score ($M = 63.9$ out of maximum 100) indicated moderately positive nurses' attitudes towards the use of computers in healthcare. According to classification categories of scale,* 46.3% *of nurses were in a realistic group, whereas there were no nurses with cyberphobia characteristics. Inferential statistics revealed a significant difference in attitudes with respect to education, place of use of computer and duration of computer use ($p<0.05$). The positive correlation was calculated between computer literacy and the attitudes towards utilization of computers in healthcare.*

Discussion: *The findings of this study show positive nurses' attitudes towards computers in healthcare, providing a good basis for the introduction of technological development, which represents a vital process for improving and restructuring healthcare. Still, it is necessary to support nurses to broaden their computer skills.*

Key words: *attitudes, information technology, computer literacy, nursing*

Introduction

Health information technology (HIT), particularly the electronic health record (EHR), has been rapidly integrated into the healthcare system in many developed countries since it has the potential to improve quality of care and patient safety by reducing the frequency of errors and cutting costs (Goldsack and Robinson, 2014; Heseels et al., 2016). Therefore, in order to improve health services, the implementation of hospital information systems (HIS) in Serbia started in 2012, in the form of a project, which was conducted jointly by the Ministry of Health and EU (HIS Implementation Guide).

Two important factors are involved in HIT implementation, i.e., the social and technical factors. The relationship between the technical and social factors is determined by four components: structure, people, technology and processes. Although each of the four components can result in success or failure of the HIT implementation, social factors are more crucial than the technical ones, as people play the vital role in the success or failure of any change process (Cresswell, Bates and Sheikh, 2013). So, the successful implementation process of HIT depends not only on equipping hospitals with new information technology, but also on the involvement of all healthcare professionals, in particular nurses as frontline care providers (Brumini, et al., 2005).

To facilitate implementation process of any HIT system, it is of importance to assess nurses' attitudes, knowledge and skills of computer applications as nurses' attitudes may affect the implementation and the use of computers in healthcare. In this respect, negative attitudes toward computers represent a potential barrier to computerisation (Kipturgo et al., 2014). The study of nurses' attitudes towards computers started in the late 1960s. Most of these studies were conducted in the USA, UK, Australia and other developed countries, but they yielded conflicting results (Kaya, 2011). On the one hand, an older study revealed that nurses' attitudes to computers were predominantly unfavourable. Nurses often viewed the implementation of HIT as dehumanizing, confusing and uncaring. Several researchers reported that high proportions of nurses are uncomfortable and inexperienced with the use of computer technology in their work (Alquraini, et al., 2007, Chow, et al., 2012). On the other hand, current literature suggests that the attitudes of nurses are generally favourable. This suggests that over time, in this increasingly computerized world, the negative attitudes have been replaced by more positive ones (Kipturgo, et al., 2014; Yontz, Zinn and Schumacher, 2015).

Nurses' attitudes towards the use of computer systems are influenced by several factors. Age, educational level, type of nursing and years of work experience have frequently been described as factors influencing nurses' attitudes towards computerisation. Brumini, et al. (2005) established that computer education and experience were significant factors that contributed to the development of nurses' positive attitudes towards computers. Similarly, Topkaya and Kaya (2015) found that computer literacy was by far the most influential factor to nurses' positive attitudes.

The implementation of HIT in developing countries like Serbia has been slow and currently the information about attitudes towards computerisation in literature is scarce. Since nurses

make up the largest part of the health workforce, their positive attitudes to computerization will be decisive in implementing the HIS.

The aim of this study was to identify the attitudes of Serbian nurses towards the use of computers in healthcare and the factors influencing their attitudes. Research questions were as follows:

1. What are the nurses' attitudes to computer use in healthcare?
2. Is there a relationship between the attitudes, computers literacy and socio-demographic variables?

Methods

The study was conducted using a descriptive, analytical cross-sectional survey method in two university hospitals between October and December 2017. Since the convenience sampling was used, all the nurses working full-time were invited to participate in the study. A total of 250 questionnaires were distributed to the two hospitals, 203 out of which were completed, returned and used for analysis. The overall response rate was 81.2%. The questionnaires were distributed at the beginning and collected the end of the first shift. Nurses were aware that their participation was both anonymous and voluntary and they handed over their questionnaires to the researcher (DM) in an unmarked and sealed envelope.

Instrument

The research instrument used included the Pretest for Attitudes Toward Computers in Healthcare (PATCH) Assessment Scale v. 3 for the assessment of nurses' attitudes, the computer literacy questionnaire for the assessment of the competence to use a computer and a socio-demographic questionnaire.

The PATCH Assessment Scale was developed by Kaminski in 1996, and its third version was published in 2011 (Kaminski, 2011). As the questionnaire was copyrighted, the permission was obtained from the author to use it in our study. The 50-item, 5-point Likert scale questionnaire consisted of positive and negative statements. The data on positive attitude statements were scored as 2 points for "agree strongly", 1.5 point for "agree", 1 point for "not certain", 0.5 point for "disagree", or 0 point for "disagree strongly", and reversely for the negative statements. The total score ranges between 0 – 100 and high scores are indicators of favourable attitudes towards computers in healthcare. Based on their score from the scale, each nurse was classified into one of the following groups: group 1 (0 – 17) indicates signs of cyberphobia, group 2 (18 – 34) indicates that the user is unsure of the usefulness of computers in health care, group 3 (35 – 52) indicates limited awareness of the applications of computer technology in health care, group 4 (53 – 69) indicates that the user has a realistic view of current computer capabilities in health care, group 5 (70 – 86) indicates that the user has an enthusiastic view of the potential of computer use in health care and group 6 (87 – 100) indicates a very positive view of computer use in health care.

The questionnaire used in the study had excellent internal consistency. Cronbach alpha coefficient for the total scale was 0.92, while inter-item correlation was 0.2 – 0.6.

The computer literacy questionnaire consisted of items grouped in two sections. In the first part, the nurses were asked to rate their proficiency in basic computer skills on 5 items using a five-point Likert scale (1 = minimum, 2 = below average, 3 = average, 4 = good, 5 = excellent). The items included word processing, use of spreadsheets, use of PowerPoint, e-mailing and the use of Internet. The second part contained 10 items regarding the computer knowledge.

The socio-demographic questionnaire was used to collect general demographics of the respondents (gender, age, educational level, work experience) and computer use (previous computer education, place of use of computer and duration of computer use per day).

Statistical Data Analysis

Descriptive statistics were used in determining mean values, standard deviation (SD), minimum (Min) and maximum (Max) values, 95% confidence interval, namely, the absolute frequencies of occurrence with corresponding percentages depending on the nature of the variables. Comparison of differences between means from two different groups was performed by T-test. One-factor analysis of variance (ANOVA) was used to compare the means of multiple groups, followed by the Tuckey post hoc test. Pearson correlation coefficient was used to determine the relationship between the parametric variables. Statistical processing and analysis of the obtained results was performed using IBM SPSS statistical software package version 23. Values of $p < 0.05$ were considered significant.

Results

Nurses' socio-demographic and computer use background

A large majority of nurses participating in the study (172; 84.7%) were female, and 31 (15.3%) were male. The average age of nurses was 37.9 (SD 10.6 years). The age of the youngest and the oldest nurse was 19 and 58 years, respectively. Most of the nurses had secondary school education (161; 79.3%), while 42 (20.7%) had various levels of higher education. The average length of work experience was 16.8 years (SD 10.6), ranging from 1 to 39 years.

Most of the nurses (154; 75.9%) had their IT courses during IT education, while 73 (36%) acquired their IT skills through non-formal education by using the computer at work. The total of 166 (81.8%) nurses use computer in the workplace and at home, 114 (56.2%) out of which use it up to 5 hours per day. Every day, 123 (60.6%) nurses use computer for seeking information, 104 (51.2%) to communicate, 99 (48.8%) for entertainment, 57 (28.1%) for writing and 48 (23.6%) for scientific research.

Nurses' computer literacy and attitudes towards computers in health care

The nurses' self-assessment of their ability to use numerical data processing software scored the lowest (M = 2.6, SD 1.1), and the self-assessment of skills to use the internet browser scored the highest (M = 4.2, SD 1.0) (Table 1).

Table 1. Self-assessment of basic computer skills

Program	Minimum	Below average	Average	Good	Excellent	Mean (SD)
	n (%)	n (%)	n (%)	n (%)	n (%)	
Word processor	39 (14.8)	33 (16.3)	56 (27,6)	54 (26.6)	30 (14.8)	3.1 (1.3)
Spreadsheets	42 (20.7)	48 (23.6)	68 (33.5)	34 (16.7)	11 (5.4)	2.6 (1.1)
PowerPoint	57 (28.1)	40 (19.7)	36 (17.7)	36 (17.7)	34 (16.7)	2.8 (1.4)
E-mailing	20 (9.9)	14 (6.9)	50 (24.6)	38 (18.7)	81 (38.9)	3.7 (1.3)
The Internet	8 (3.9)	6 (3.0)	29 (14.3)	51 (25.1)	109 (53.7)	4.2 (1.0)

The mean computer knowledge score of all nurses was 6.3 ± 1.7 out of maximum 10 (the lowest score was 2, and the highest 10).

The mean scores of knowledge level varied significantly with respect to age of nurses ($F = (2, 200) = 3.4$, $p = 0.03$). It was observed that the nurses under the age of 30 had higher scores than those aged over 40. A statistically significant difference in the computer knowledge mean score was also observed in relation to place of computer use ($F= (2, 200) = 4.2$, $p = 0.01$). Nurses who used computer only at work had significantly lower total scores (5.3±2.0), compared to those who used computer both at home and at work (6.4±1.7). Yet, there were no statistically significant differences regarding other socio-demographic characteristics und computer use background.

The average score on the PATCH Assessment Scale was (M = 63.9, SD 13.4) from possible score of 100. According to scores they received from the PATCH Assessment Scale, the majority of nurses were categorized into the group 4 (46.3%), and group 5 (30.5%), whereas a small percentage of nurses were in the groups 3 (18.7%), 6 (3.0%) and 2 (1.5%).

Table 2 shows descriptive and inferential statistics of the PATCH Assessment Scale total scores by demographic and computer use characteristics of the nurses. The average values of total score in the PATCH Assessment Scale were significantly different in respect to education ($p = 0.038$), place of use of computer ($p = 0.003$) and duration of computer use per day ($p = 0.001$) (Table 2). In relation to other characteristics of nurses, there were no statistically significant differences in attitudes towards computers in healthcare.

When examining the influence of nurses' educational level on PATCH Assessment Scale score with the post hoc analysis, the difference between secondary school and bachelor's degree – voc**.** group ($p = 0.05$) proved to be statistically significant (Table 2).

The impact of nurses' place of use of computer variable on PATCH Assessment Scale score was also tested with the post hoc analysis and statistically significant differences between the two groups ($p = 0.007$) groups were established. The highest PATCH Assessment Scale score was obtained by nurses using computers both at home and at work, followed by those who use computers only at work and only at home. (Table 2).

When testing the impact of nurses' duration of computer use variable on PATCH Assessment Scale score with the post hoc analysis, the differences between the groups with less than 1 hour and 1 – 5 hours (p = 0.018), and less than 1 hour and more than 5 hours (p = 0.001) were found to be statistically significant. The highest mean PATCH Assessment Scale score was achieved in the group using the computer more than 5 hours per day (Table 2).

Table 2. The total PATCH Assessment score: differences in relation to general characteristics of nurses

	n	**%**	Total score Mean (SD)	F/t	95%CI	p
Gender						
Male	31	15.3	64.8 (14.3)	0.395		ns
Female	172	84.7	63.8 (13.3)			
Age						
< 31	70	34.5	63.3 (13.6)			ns
31 – 43	72	35.5	63.5 (13.7)	0.360		
• 43	61	30.0	65.1 (13.4)			
Education level						
Secondary school	161	79.3	62.4 (12.9)			0.038*
College	5	2.5	67.7 (13.8)			
Bachelor degree – vocational	21	10.3	70.6 (12.7)	2.593		
Bachelor degree – university	8	3.9	70.3 (19.6)			
Master degree	8	3.9	67.8 (14.2)			
Work experience						
< 10	73	36.0	63.4 (13.9)			ns
10 – 21	63	31.0	64.9 (13.3)	0.241		
• 21	67	33.0	63.6 (13.1)			
Informatics education						
Yes	154	75.9	64.4 (13.6)	0.870		ns
No	49	24.1	62.5 (12.8)			
Computer education						
Yes	73	36.0	65.6 (11.8)	1.334		ns
No	130	64.0	63.0 (14.3)			
Place of use of computer						
At work only	24	11.8	56.7 (15.0)			0.003*
At home only	13	6.4	58.0 (15.4)	6.087		
Both home and at work	166	81.8	65.4 (12.6)			
Duration of computer use per day						
Less than 1 hour	75	36.9	60.0 (14.4)			0.001**
Between 1 and 5 hours	114	56.2	65.3 (11.9)	7.834		
More than 5 hours	14	6.9	73.5 (13.1)			

F = ANOVA; t = T test; ns = non-significant; *p< 0.05; ** p < 0.001

There was a significant positive correlation between PATCH Assessment Scale score and the computer knowledge total score (r = 0.179; p = 0.05). These data showed that PATCH Assessment Scale score increased with the increased computer knowledge score.

Discussion

Nurses' attitude towards computers may have a potential effect on their taking advantage of nursing informatics. If nurses do not use computer technologies, nursing practices will not be integrated into patient electronic health records in accordance with the nursing process, which in turn, could result in some patient safety and quality of nursing care issues (Kaya, 2011).

Attitudes of the study participants towards computers and the factors that affect their attitudes were investigated by using the PATCH Assessment Scale v. 3 which had very good psychometric characteristics.

According to the average total PATCH Assessment Scale score in this study, the nurses have a positive attitude towards computerisation. Although nearly half of the nurses (n = 94; 46.3%) felt comfortable using computers. Although they were aware of the usefulness of computers in a variety of settings and had realistic views of current computer purposes in health care, only 3% (n = 6) had a very positive view. These findings are consistent with the results of other studies (Kaya, 2011; Topkaya and Kaya, 2015; Yontz, Zinn and Schumacher, 2015).

The majority of the participants were female since nursing is still a female dominated profession. Gender did not have any effect on the nurses' attitudes towards computerisation. These results are contrary to the findings of Sukums et al. (2014) who reported that male health workers had more positive attitude to computers.

Even though some researchers suggested that younger nurses were more positively inclined to computer use than their older colleagues (Brumini, et al., 2005; Kaya, 2011, Kipturgo, et al., 2014), our results indicate that there is no significant association between computer use and age.

Previous research on nursing attitudes confirmed that educational level is related to attitudes towards computers. Most studies agree that the more education nurses have the more sympathetic they are to computers (Alquraini, et al., 2007, Brumini, et al., 2005; Kaya, 2011, Kipturgo, et al., 2014, Sukums, et al., 2014). Similarly, the present study revealed that more positive attitudes towards computers prevail in nurses with higher level of education. On the other hand, the differences between the groups in relation to the effect of work experience were not statistically significant. This corresponds with the findings of other studies (Kaya, 2011, Kipturgo, et al., 2014).

The results of the present study also indicate that the place of use of computer and duration of computer use per day have a significant impact on the nurses' attitudes towards computers. Nurses who used computer both at home and work more than 5 hours per day had more favourable attitudes towards computers and also possessed better computer literacy than their counterparts. These nurses achieved a higher score on computer knowledge test than those who used the computer less frequently (6.4 *vs* 5.3).

In general, the participants' computer literacy was at the intermediate level and the majority of them had only basic computers skills, such as using Word processor and PowerPoint. Our

results are in agreement with Topkaya and Kaya (2015) study. Significant positive correlation was found between the nurses' computer knowledge test score and PATCH Assessment Scale score. Computer-literate nurses showed more positive attitudes towards computers in healthcare. These findings support the findings of Alquraini et al., (2007) who claimed that prolonged use of computers enhances the skill levels of the users, leading to a positive attitude.

The study results can only be applicable to the healthcare institutions where this study was conducted.

Conclusion

Today, the HIT has effected many changes in health care and nursing. In order to properly utilize the HIT, a positive attitude towards computer is necessary. The present study confirmed that it is necessary to acquire adequate computer skills to be able to develop a positive attitude towards computer. Thus, it is necessary to provide support for nurses to improve their computer skills through education to achieve efficient use of computers in health care.

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A SMARTPHONE APPLICATION WITH TINNITUS INFORMATION, AS A THERAPEUTIC APPROACH

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Abstract

Introduction: *The use of a material such a short manual containing with information about tinnitus and how to deal with this it, has been found to be very effective for patients, and should be considered as a therapeutic approach. Accordingly, the authors have also developed an application containing this type of information for smartphones and have also evaluate its effectiveness.*

Methods: *After developing the smartphone application together with the Department for Informatics at the Polytechnic Porto school, taking as reference for this the physical manual previously developed and currently used, the authors used the same methodology as before to evaluate the effectiveness of the previous instrument. After an anamnesis, the Portuguese version of the Tinnitus Handicap Inventory, the instrument used to evaluate the disturbance and the Quality of Life of tinnitus patients, was used on the participants to control inclusion and exclusion criteria. The patients were recruited from the ENT Department of Hospital das Forças Armadas (Porto).*

Results: *A review of the literature has shown the effectiveness of using smartphone applications with other health issues, particularly in adherence to medication, in Psychological therapy, and with various mental health conditions. Therefore, it was expected that the results would show a positive effect for tinnitus patients, that is lower discomfort and intensity of tinnitus perception, improvement of QoL and self-efficacy, and a decrease in depression and anxiety.*

Discussion: *The application offers patients some information on tinnitus and how to deal with it, how to use the material to avoid frequent visits to the clinic, and how to better control their anxiety as a result of being far away from help or not receiving a consultation urgently. The smartphone application could prove to be another innovative approach in dealing with tinnitus.*

Keywords: *smartphone application, therapeutic approach, tinnitus*

Introduction

Tinnitus is defined as a hearing sensation without external sound or vibration, not heard by others[1]. It is a symptom, not a disease, and quite often the cause is unknown[2,3]. It is quite common, as almost 25% of the population has had tinnitus. Although there are many patients that have not been perturbed by tinnitus, 2% of the population are severely perturbed[3,4].

Tinnitus affects the patients' quality of life, but there is effective therapy[5,6]. As it affects patients' emotional state, psychotherapy is often used in the treatment, the Cognitive-Behavioral Technique (CBT)[7,8] being used most frequently. To complement this technique, and to offer the possibility of having some resources that the patient could use at home, some authors prepared leaflets or booklets with information on tinnitus and the strategies to help the patients deal with it[9]. One of these booklets was developed for use among the Portuguese population with tinnitus, containing information about physiology of hearing, the possible causes and strategies to use when it worsens, but the patient cannot come to the clinic. The booklets also contain relaxation techniques, and other practical information and strategies to help patients deal with this problem[10]. We have realised that the patients who use this booklet significantly improved their ability to deal with tinnitus, and more so compared to others that were not using it[11].

With the technical advantages given by smartphones, alongside the positive results obtained in internet-delivery treatments such as CBT, the use of smartphone applications can partially compensate for the lack of therapists in some regions, and the difficulties that some patients had with coming to further consultations or therapeutic moments[12,13]. EHealth is an innovative method of delivering therapeutic content, which is often used to alleviate anxiety and depression and has brought good results. Since emotions are also affected in patients who suffer from tinnitus, a smartphone application for tinnitus patients has been developed since, after consulting electronic bibliographic data bases such as PubMed, Web of Science and ClinicalKey, we only obtained references in relation to the use of the kinds of applications which control sound therapy, or track the individual tinnitus, or control daily situations which could affect tinnitus perception[14,15].

The idea was to use the previous booklet as a basis to develop the smartphone application with tinnitus information and therapeutic strategies.

Methods

Participants and instruments

The study population consisted of individuals with chronic tinnitus, with normal hearing or mild hearing loss (PTA <40 dB), to prevent that hearing loss could interfering with coping evaluations.

The sample was constructed by sequence and convenience[16], with patients, of legal age, following the ENT consultation at the Hospital das Forças Armadas (Pólo do Porto), located in

Porto, Portugal, who had been complaining about suffering from tinnitus for at least six months and were thus considered chronic.

There were two groups: the control group, treated by using a standard approach in the consultation, who re-evaluated six months after, and the intervention group that had access to the application and who were given some information about its use and the main objective.

Instruments

In previous work[10] on the booklet, we noticed that the people who had that instrument were better at dealing with tinnitus compared to the control group.

Our hypothesis was that with the smartphone application the results would be similar or better. To measure this, we used the Portuguese version of Tinnitus Handicap Inventory (THI), a questionnaire which allows evaluation of the disturbance caused by tinnitus, and the quality of life related to its presence[5,17,18,19] just as it was conducted in the previous work. The results were compared six months after use. The THI has three subscales; the functional, concerning physical and social implications, the emotional, relating to emotional and psychological aspects, and the catastrophic, which reflects negative sensations related to the tinnitus presence[17]. It is an easy-to-use questionnaire, usually self-administered, and is fast to quote by the professional[17]. The validity and reliability of the instrument are quite satisfactory with an alpha of Cronbach for the original instrument of 0.93, and for the Portuguese translation valued at 0.86[17,20]. The British ENT Association recommends their use as an instrument to evaluate the severity degree of tinnitus presence, helping to measure their disturbance[21].

A sociodemographic and clinical questionnaire was developed for the previous investigation and was also used in this one.

Procedures

The patients were invited to participate in the study after the ENT consultation and an audiological evaluation. Then, after having been explained the purpose of the study and receiving a description of the procedures that would be administered, they were invited to read and sign the consent form to participate in the study.

Afterwards, the patients completed the sociodemographic questionnaire and the Tinnitus Handicap Inventory. Those from the investigation group received the manual and some information concerning their objectives and instructions on how to use it. After almost six months the patients were reevaluated, using a different sociodemographic questionnaire and the Tinnitus Handicap Inventory.

The results obtained were treated statically using SPSS v20.0, and the support of the Statistic Department of the Health School of Polytechnic of Porto.

Results

A manual was prepared for the patients. To confirm its usefulness for the patient, a second evaluation of tinnitus discomfort was made six months later, comparing the results of the control group with the investigation group.

The sample was composed of 58 individuals from the ENT consultation of Hospital das Forças Armadas – Pólo do Porto, with an average age of 56.6 years (27-66; PD=9.09), 37 men (63.8%), with an average hearing of 26.1 dB (11.9-40.0 dB; PD=7.16) and with tinnitus complaints over a period of 4.96 years (0.5-40.0; PD=7.37) on average.

The control group (CG – *N*=31), comprised of those without the manual, received only verbal information about tinnitus and some basic advice on how to deal with it. The other group was the intervention group (IG – *N*=27) and was composed of those to whom the manual was given: They received some information about their objective and how to use it.

By means of using the Tinnitus Handicap Inventory, we tried to compare the results obtained in both moments of evaluation in order to evaluate the efficacy of the manual as a therapeutic approach of tinnitus, using the Wilcoxon test.

Concerning tinnitus intensity (Table1), after comparing the results of both groups in the two moments, the results decreased from the first to the second evaluation, so the patients considered that the tinnitus intensity was lower, but only statically in the IG.

Table 1. Tinnitus intensity in both moments

	N	*Mínimum*	*Maximun*	*Average*	*Pattern Deviation*	*p*
Tinnitus Intensity CG – Evaluation 1	31	3	10	5,84	1,92	0,117
Tinnitus Intensity CG – Evaluation 2	31	1	9	5,23	2,23	
Tinnitus Intensity IG – Evaluation 1	27	3	10	5,56	1,85	**0,030**
Tinnitus Intensity IG – Evaluation 2	27	1	8	4,59	2,13	

With the use of Tinnitus Handicap Inventory, we established that in the CG the results were higher in the second moment, so the quality of life of these patients worsened. However, for the IG the results indicated the opposite, suggesting a better quality of life by obtaining better results in the second moment (Table2).

Table 2. Comparison of THI (QoL) in both moments

	N	*Minimum*	*Maximum*	*Average*	*Pattern Deviation*	*p*
Total THI CG –Evaluation 1	31	10	60	32,32	14,69	
Total THI CG – Evaluation 2	31	0	84	39,94	23,23	0,119
Total THI IG – Evaluation 1	27	4	94	40,59	23,59	**0,022**
Total THI IG – Evaluation 2	27	2	84	32,37	22,33	

We hypothesized that these results will be replicated using the smartphone application.

Discussion

When analysing the perception of tinnitus intensity, we realised that the results were better for both groups in the second moment of evaluation; however, the results were only significant for the intervention group. Therefore, we can assume that the use of the manual helped the patients to relativize the discomfort of tinnitus. These results were confirmed by those obtained with the Tinnitus Handicap Inventory, where the intervention group obtained significantly better results from the first to the second evaluation, which demonstrate that the quality of life of these patients improved.

If a patient could have an easy instrument to use, such as a smartphone application that they could carry with them easily, then the results might further improve.

Conclusion

From the previous study using a paper manual which was designed to give information about the hearing function and tinnitus, and with some simple strategies that could help tinnitus patients, we intend to develop a smartphone application as an easier solution for tinnitus patients to obtain help in a more consistent and patient-friendly manner.

In a further study, we will try to confirm the hypothesis that the results obtained will be replicated, or even better, that the patients can use the instrument more easily and will, henceforth, use it more often.

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PATIENT EMPOWERMENT IN THE DIGITAL ERA THROUGH THE EYES OF HEALTHCARE STUDENTS

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Abstract

Introduction: *Based on the conceptualization of empowerment, we present a study of the perception of healthcare students regarding their empowerment as patients in the contemporary healthcare system. More emphasis is given on stress management and well-being at the workplace through safe and suitable use of technology. Personal relationships with doctors might be lost as a result of the Internet and e-health services, which is an ethical dilemma.*

Methods: *A survey was used as the main research method in addition to description. The sample was composed of 30 students from three healthcare study streams, attending the course entitled Management in healthcare.*

Results: *The research indicates that smart technologies have strengthened the influence of patients and assigned them a more balanced place in the healthcare system. Technology also enables patients to have more self-regulation and self-control.*

Discussion: *The evolution of healthcare education in line with the use of the Internet in healthcare settings is discussed.*

Keywords: *healthcare education, knowledge management, e-learning*

Introduction

Theoretical background

Patient empowerment is a process designed to facilitate self-directed behavior change. From the perspective of Freire (1993), empowerment consists as both a process and an outcome, or with the purpose of an educational intervention, when one's ability to think critically and act autonomously increases. It may also refer to an outcome when an enhanced sense of self-efficacy occurs as a result of the process (Anderson, Funnell, 2010). To maximize the chance for success, patients must be internally rather than externally motivated (Williams, et al., 1996).

Patient empowerment has been associated with positive health and clinical outcomes including improved disease management, effective use of health services, improved health status, and medication adherence (Tejada, et al., 2012; Carney, 2008; Tsay, et al., 2004; Bergsma, 2004; Lorig, et al., 2003; Endicott, et al., 2003; Webb, et al., 2001; Roberts, 1999; Zimmerman, 1988; Rappaport 1987; Rappaport, 1981).

Authors Graffigna, et al. (2015), Kidd, et al. (2004) and Pibernik-Okanovic, et al. (2004) argued that empowered patients could challenge healthcare professions. The process should be performed by asking questions regarding their care, taking responsibility for their own health, seeking care only when necessary, and making decisions using all available information (Kidd, et al., 2004; Pibernik-Okanovic, et al., 2004).

Empowerment as a concept that involves groups or organizations and job or work-related outcomes, improves employee satisfaction and provides discretion over work. Forms of intervention might vary in different work contexts according to factors such as cultural or societal values, power, distance, and organizational hierarchies (Liao, et al., 2009; Hui, et al., 2004; Robert, et al., 2000; Tjosvold, et al., 1998; Argyris, 1997; Kelley, 1996; Zimmerman, 1995).

Patients can feel psychologically empowered and this sort of acquired internal power can translate into a cooperative relationship with the physician, thus bringing positive outcomes for both. Petrič, Atanasova and Kamin (2017) termed such empowerment functional. However, a patient's feelings of empowerment can also be transformed, especially under conditions of low eHealth literacy and the presence of a paternalistic physician, into a manipulative, disrespectful, and generally negative stance toward the physician. Petrič, Atanasova and Kamin's (2017) findings suggest that unverified information can be inhibited by filtering experiential knowledge through health professional moderators and by raising awareness regarding the importance of eHealth literacy when dealing with online health information.

Patient empowerment is nothing but a capacity-building process. Empowered patients believe that they can play an active role in the management of their own health and make decisions related to it (Jiban, et al., 2017).

Aujoulat et al., (2008) found that the majority of studies that focus on patient empowerment tend to address two issues of patients' experience of illness more specifically: managing regimens and health-care providers relationships, which is why they argue in their study that the process of relinquishing control is as central to empowerment as is the process of gaining control. Patient empowerment is a conceptual shift in the patient-doctor/nurse relationship where patients become active partners in healthcare (Funnell and Anderson, 2003). Participant patients in a study by Fox, Ward and O'Rourke (2005) shared information and supported each other as they used the medicine, and emerged as "expert patients" in relation to their treatment in the process.

Holmstrom and Roing (2010) distinguish between patient-centeredness and patient empowerment. Patient-centeredness can be the goal of an encounter between the patient and caregiver. Patient empowerment appears to be broader than patient-centeredness, and may

place greater demands on caregivers and the organization of healthcare. Patient-centeredness and patient empowerment are complementary concepts, which do not oppose one-another. Patient empowerment can be achieved by patient-centeredness, but patients can also empower themselves.

Methods

Our research is composed of a study conducted on a sample of 30 students attending the course entitled Management in healthcare. Firstly, we grasped students' personal experience (Toma, 2000) as patients in the digital era. We were focused on students' patient experiences, looking in-depth at what value they get from contemporary information and online sources. The research was conducted 4 October 2017. The method of data collection was an open-ended questionnaire. The analysis was based on grasping the main themes, development of categories and qualitative judgements. Interpretation of the results is also given.

Results

Students' favorite IT supported practices in healthcare are presented in Table 1. As it can be observed, students are aware that e-business is also entering the healthcare system and they were able to notice several innovative applications and e-communication and recognize them as an advantage of modern times.

Table 1. Innovative IT supported practice in healthcare

Student A	*"3D printing"*
Student B	*"CAD-CAM (computer-aided design and computer-aided manufacturing)"*
Student C	*"applications that are already on our phones and raise our awareness about a healthy diet, fitness and diseases – measuring blood pressure"*
Student D	*"Glow check – of surfaces so we can detect the cleanness of the facilities if they were cleaned in 24 hours"*
Student E	*"e-receipts"*
Student F	*"e-communication with patients"*
Student G	*"evidence-based practice"*

Evolution of the role of the patient in the healthcare system is presented in Table 2. The students see the role of patients today as more proactive than it used to be. However, they do not mention the trust issue at all, but only state that the responsibility of the patients has risen, which means that present-day patients have several options to inform themselves and tools to act in accordance with the doctor's instructions.

Table 2. Evolution of the role of the patient in the healthcare system

Student A	*" Patients today are more free to **decide**, gain information on the Internet, attain a second medical opinion, or choose another physician."*
Student B	*"Patients know their **rights** better."*
Student C	*"Patients can **inform** themselves better in scientific and professional journals."*
Student D	*"Patients have more possibilities to **collaborate** with healthcare experts and express their opinion."*
Student E	*"In the past they looked at a patient as a machine. Today they look at the patient **holistically**; more emphasis is given to the patient."*
Student F	*"In the past the doctors had the absolute authority. Today, patients **ask** a lot of questions."*
Student G	*"Today, the patient is more **active**. He/She needs to do a lot for an effective result."*

In Table 3 students expressed the need to teach patients how to critically evaluate the information gained on the Internet. The question is whether contemporary healthcare education is providing this kind of training sufficiently or is it overly focused on professional staff in healthcare organizations and needs to be adjusted to the public. How would the training be designed and what would the main elements be? Who would execute the training for the public? There is also the question of the level of education that, according to them, plays an important role in knowledge empowerment as patients. Younger generations seem to be more empowered in the knowledge that is accessible online, but older generations gain knowledge based on their experiences.

Table 3. Knowledge empowerment of contemporary patients

Student A	*"Patients **rely too much on the Internet** where information is not always accurate."*
Student B	*"It is important that healthcare workers know **how to explain, using simple words,** patients' health conditions."*
Student C	*"It depends, some take care of their health, read books, **consult** with healthcare experts, etc."*
Student D	*"Older patients are not informed enough and do not **take decisions** on their own. It often happens that relatives make decisions instead of them."*

The doctors are the most valuable source of information according to healthcare students as shown in Table 4. It can be noticed that books are not the first source of information. Healthcare experts provide information related to the use of modern technology online through several different forums. It is important who the provider of the information is. Teams of healthcare experts are suggested to provide the most valuable source of information.

Table 4. Providers of quality information to the patients

Student A	*"**doctor**"*
Student B	*"**healthcare experts** through private conversation and their online answers"*
Student C	*"**leaflets** that the patient can receive in the waiting rooms"*
Student D	*"**handbooks**"*

Table 5 shows that patients who have correct information are easier to talk to. However, if they think that they have correct information when in fact they do not, this makes the interaction with healthcare workers even more difficult. Healthcare students expressed the need to be trained in how to talk to patients. They think that the healthcare system encourages informed patients.

Table 5. Interaction of healthcare workers with informed patients

Student A	*"Informed patients make the interaction easier as you can **rely on them** that they will take the medication in the correct way, that they will change their habits as they will understand their health condition."*
Student B	*"If the patient is critical towards information this makes the interaction easier, however if the patient is uncritical this can lead to **conflict.**"*
Student C	*"It depends on where they retrieve information from and what kind of illness they have. Information can cause confusion and fear if they don't know how to **interpret the information correctly.**"*
Student D	*"It makes the interaction harder if the patients think they know everything, however, if they come to the consultation with healthcare workers and ask **informed questions** this makes the interaction easier."*
Student E	*"It makes the interaction easier as the patient doesn't need to come to the doctor for every **minor thing**."*
Student F	*"Informed patients make healthcare workers act in a more **professional manner**."*

Table 6 shows that students need more explanation from the part of healthcare workers. They also need more time spent with them when they are patients and advance their basic knowledge. The role of a nurse is viewed in terms of a team. Nurses play a key role in supporting the process of healing that is based on their organizing and soft skills.

Table 6. Perception of the role of the doctor and the nurse

Student A	*"Nurses are usually **friendly** and nurturing with me."*
Student B	*"Many times I experienced a total **loss of interest or absence** from the healthcare worker."*
Student C	*"I saw the doctor as a "**saver**" as my health was in that moment my main concern and value."*
Student D	*"The nurse was kind, professional and "**human**"."*
Student E	*"The doctor **doesn't take enough time for talking**. The nurse finishes off with me very quickly and sometimes not thoroughly enough."*
Student F	*"The nurse needs to be very **patient and adjustable** whereas the doctor needs to explain in plain words the condition to the patient so the patient can understand."*
Student G	*"The nurse is of help and **support** both to the doctor and the patient."*
Student H	*"The nurse was in charge of documentation and the doctor examined and prescribed medication."*

Table 7 shows that conversation is an integral part of the healthcare system, however, due to limited time, it is often neglected and left out. Healthcare students discuss what encompasses the healthcare service, where they notice that conversation needs to have a bigger part.

Table 7. Role of the conversation in the healthcare system

Student A	*"Raising awareness and conversation with the patient is an important part of the **healthcare service**."*
Student B	*"Conversation builds **trust** in the healthcare system."*
Student C	*"Patients **expect** conversation."*
Student D	*"We are responsible to **educat**e patients about their health."*
Student E	*"It is vital for the **success** of the healing process."*
Student F	*"I always **dedicate** at least 20 minutes to the conversation."*

Conclusion

Based on the conceptualization of empowerment, the study of healthcare students' perception of their empowerment as patients in the contemporary healthcare system found that knowledge and experiences with the healthcare system are often not aligned. More emphasis should be given to stress management and well-being at the workplace through safe and suitable use of technology. Students feel that due to their education they sometimes feel anxious when being a patient, as they know what can go wrong and are quite critical of the implementation of the healthcare processes by their elderly colleagues. Losing the personal relationship with the

doctors may come as a result of the Internet and e-health services, which poses an ethical dilemma. On the other hand, e-health services are viewed as providers of efficiency and flexibility.

Based on the presented study, our recommendations are directed at adjusting the healthcare management course to accommodate the needs of the students. More emphasis is given to learning the organization and its elements, such as project work in teams, so that the students can analyze a contemporary healthcare organization and within this organization one management function, as well as provide sound recommendations on the basis of the analysis, which they see as needed based on the theoretical overview.

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REDUCING SEDENTARY TIME

ZMANJŠEVANJE ČASA SEDENJA

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Abstract

Introduction: *Most people spend sitting more than 9 hours per workday. Pupils, students and office workers sit for at least 11 hours per day on average. Numerous studies over the past twenty years tried to identify the best strategies for reducing the total daily sedentary time. The purpose of the "Reducing sedentary time" pilot study was to ascertain whether prolonged sitting could be reduced by using evidence-based strategies. The aim of the study was to determine whether the use of mobile applications and physical activity correlate with the total daily sedentary time.*

Methods: *The study sample consisted of high school students, college students and administrative workers (n= 85). A short self-reported questionnaire was used for six measurements of sedentary time in the one-month pilot study. The data were statistically analysed with the SPSS version 24, using descriptive statistical methods, non-parametric t-test and the correlation coefficient.*

Results: *The total sitting time was on average reduced by 111 min among 37 participants. The sitting time at the workplace and at school was only slightly reduced. Low (walking) and high physical activity did not reduce sedentary time.*

Discussion: *To reduce sedentary time, it is necessary to focus on altering the individual's sedentary behaviour rather than trying to increase their physical activity.*

Keywords: *sedentary time, the effectiveness of strategies, applications*

Izvleček

Uvod: *Večina oseb v običajnem delavniku povprečno presedi več kot 9 ur dnevno. Dijaki, študentje, zaposleni v upravno administrativnih službah, sedijo več kot 11 ur, kar izkazuje visoko stopnjo tveganja za nastanek bolezni kot so rak, diabetes in prezgodnjo umrljivost. Dolgotrajno sedenja je javno zdravstveni problem, proučevan v številnih raziskavah zadnjih dvajset let. V enomesečnem pilotnem projektu pri dijakih, študentih in upravno administrativnih delavcih smo želeli zmanjšati čas sedenja.*

Metode: *Preiskovanci (N = 85) so s kratkim vprašalnikom izvedli šest merjenj časa sedenja v običajnem delovnem dnevu. Čas sedenja smo zmanjševali z edukacijo, aktivnimi odmori, menjavo položaja sede – stoje, mobilno aplikacijo štetje korakov in drugimi strategijami.*

Podatki so bili statistično analizirani s programom SPSS, verzijo 24, z uporabo deskriptivnih statističnih metod, ANOVE in koeficientom korelacije.
Rezultati: *Študentje in dijaki so veliko uporabili aplikacijo štetje korakov, vsi preiskovanci menjavo položajev sede - stoje, aktivne odmore, skrajšali so čas gledanja TV. Zmanjšal se je čas sedenja doma, na delovnem mestu in v šolah se je čas sedenja minimalno zmanjšal.*
Razprava: *Evalvacija uporabljenih strategij za zmanjševanje časa sedenja izkazuje, da je ukrepe za zmanjševanje časa sedenja doma smiselno uvajati na nivoju posameznika. V šolskem in delovnem okolju je za učinkovito zmanjšanje časa sedenja potrebno uvajati sistemske ukrepe.*

Ključne besede*: prekomerno sedenje, merjenje, mobilne aplikacije, učinkovitost strategij*

Introduction

Today's population could be referred to as a sedentary one, with an increasing number of people spending more time sitting than sleeping. One of the basic characteristics of modern lifestyle is sedentary behaviour. The International Journal of Behavioural Nutrition and Physical Activity (2012) definies sedentary behaviour as follows: *"*Sedentary behaviour is any waking behaviour characterized by an energy expenditure ≤1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture. In general, this means that any time a person is sitting or lying down, they are engaging in sedentary behaviour.*"* Common sedentary behaviours include TV watching, video game playing, computer use - collectively termed "screen time", car-driving, and reading. The Health Behaviour in School Aged Children Study conducted in Slovenia (Jeriček Klanjšek, et al., 2015) shows that every fifth adolescent spends more than 4 hours of their leisure time in a sedentary position. Kropej (2007) states that besides sedentary activity at school, the seventh-graders spend additional 4.7 hours in a sedentary position at home. Australian children's daily screen time is approximately 3.5 hours and the overall sedentary time is 6 hours (Australian National Children's Nutrition and Physical Activity Survey, 2007). An Australian study focusing on office workers showed (Chau, et al., 2014) that their total sedentary time in a workday was 11.8 hours. The Get Britain Standing Organization reports that sedentary behaviour in office workers is slightly higher at 65-75% of people's total waking hours (getbritainstanding.org). Many computer-related professions include up to 8 hours of sitting in the workplace (Ninčevič, Bilban, 2010). The average daily sitting time for the Sloveniens participating (N = 662) in the study (Plemelj, 2017) was 9.35 hours, with 11 hours for senior officials and 10.5 for other administrative workers.

Prolonged sitting represents a serious public health issue and many even describe it as more hazardous than smoking. It is related to musculoskeletal diseases, cancer, diabetes, depression and premature mortality (Wilmot, et al., 2012). The sources available report different data on the amount of time posing the risk for the development of the so-called "sedentary diseases". By reviewing the findings of recent studies, we can draw a conclusion that a daily amount of sitting from 7 up to 8 hours represents a health risk factor (Biswas, et al., 2015; Kastelic, Šarabon, 2017). Bauman, et al. (2009) state that sitting for more than 10 hours a day represents

a high risk level. Some countries, including the United Kingdom, Australia and Canada, have issued national recommendations for reducing sedentarity. The recommendations include reducing the adolescents' screen time to 2 hours at most during their leisure-time, frequent breaks of sedentary activity (the recommended duration of sitting is maximum 20 minutes.) and reducing the amount of motorized transportation. Applications, conceptualized with the strategies of behavioural theories, are gaining ground abroad. In the USA, King at al. (2013) tested the use of applications with three programmes aimed at reducing sedentary behaviour. The analytically framed part focused on personalized goal setting, self-monitoring, and active problem solving around barriers to behaviour change. The socially framed part focused on social comparisons, norms and support. The affectively framed part focused on operant conditioning principles of reinforcement scheduling and emotional transference in order to increase physical and reduce sedentary activity. The participants of the 5 – / to 8 week programme increased their daily walking time, boosted their moderate physical activity in decreased time spent watching TV. The total of 87 % of the participants estimated that the application was user-friendly and only 11 % claimed that it was too time-consuming. The "SitCoach" mobile application is designed to notify office workers when it is time to take regular breaks from prolonged sedentary work via SMS messages. After conducting a 6-weekstudy, van Dantzig et al. (2013) found a significant decrease in sedentary activity compared to the control group that did not receive SMS reminders. The results of a 4-day measurement of leisure-time physical and sedentary activity of overweight schoolchildren via a mobile phone application in a study conducted by Dunton et al. (2011) confirm the usefulness and credibility of the application for promoting physical activity. The Slovene market offers many mobile phone applications that promote physical activity, for example 1, 2, 3 Ljubljana, Endomondo and Sports Tracker. The COBISS database has yielded no results of any study on the subject of mobile phone applications in relation to reducing sedentary activity. The closest approximation might be the e-Gibalec (Vito, et al., 2017), an application that encourages children in elementary school, their teachers and parents to do more physical exercise.

The purpose of the pilot study "Reducing sedentary time" was to determine whether prolonged sitting could be reduced using evidence-based strategies.

Methods

For the purpose of the study, the quantitative research approach was used. A one-month project "reducing sedentary time" was conducted on the basis of the behavioural theoretical frame. The following research questions were posed: which are the most common and most effective strategies, how common and effective are mobile phone applications, to what degree the time of sitting in the workplace and at home was reduced. The following two hypotheses were tested:

1. The preliminary self-assessment of the overall sedentary time significantly differs from the final one.
2. Physical activity does not correlate with the decrease of the total daily sedentary time.

Measurements

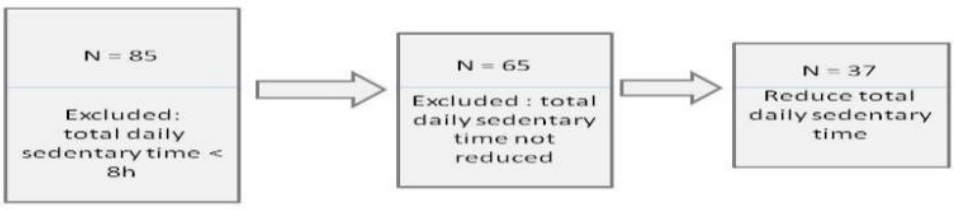
For the purpose of the pilot study, a two-part questionnaire was designed. The overall sedentary time and sedentary time during workhours was measured by means of self-monitoring via public domain questionnaires (available on http://www.juststand.org/, http://www.ergotron.com/sitting-time-calculator). The recorded times of sitting (in minutes) at breakfast, during commute, morning work, lunch, and afternoon work, watching TV and playing computer games, using the computer at home, at dinner and miscellaneous other activities during the day. Each of the six time recordings includes an overall daily sitting time. The Cronbach alpha for measuring the duration of sedentary activity was 0.83. Our second questionnaire was grounded on evidence-based strategies, tested in 16 foreign and domestic studies which were conducted from 2006 to 2016. The chosen strategies were: a decrease in time spent watching TV and playing computer games, walking, breaks of sedentary behaviour by standing up and stretching, in-person socialising instead of using social media, using mobile phone applications (e. g. pedometer, 60-minute high-intensity workout). The reliability of the questionnaire, measured by Cronbach alpha, was 0.70. At the end of the project, an evaluation was performed, based on the validity of statements on a 7-point number scale.

Participants

The study participants (n = 85) were high school students from various high schools (n = 24; average age 18 years), students of occupational therapy, students of the Buildings study programme (n = 35, average age 22.4 years) and administrative workers (n = 26, average age 38.6 years). There were 20 men and 65 women. Out of 85 subjects, only those whose daily sitting time is a minimum of 8 hours per workday (which represents a high-risk level of developing sedentary diseases) were included in the project. The study participants were acquaintances of the project managers. Table 1 shows the participants' field of work/degree of study.

Study Design

The participants completed the education course in October and November 2017 (lecture, videos, press material, demonstration of stretching and stabilizing exercises, strategy presentation) on a voluntary basis and were invited to participate in a one-month project. Each time a participant noted their sitting time, they had to choose a strategy for reducing sedentary behaviour. For each notation, the participants received a reminder and had the support of project managers. The five time recordings which followed, included the estimated reduction of their sitting time at school/work and at home (in minutes). Picture 1 shows the research process.



Picture 1. Research process

The project was carried out by the author of the present article and the third-year undergraduate occupational therapy students within the scope of their elective subject. The acquired data were statistically analysed with the SPSS v. 24 software package. Descriptive statistics, reliability coefficient and t-test were applied.

Results

20 participants out of the total sample (n = 85) 20 had an average overall daily sitting time of 7.7 h. As this is below the moderate risk level, they were excluded from further participation. The majority of them were students (14). Out of all the remaining subjects (n = 65), high school students have the highest overall average daily sitting time and college students have the lowest. Only high school students exhibited a statistically significant difference between the initial and final time recordings, namely, in the time sitting at school and during commute. The average overall daily sitting time recordings for individual activities of the participants (n = 65) is presented below (Table 1).

Table 1. Initial (1), final (6) and the average (M) time recordings of sitting time per groups of participants

N = 65	**High school Students (n = 23)**			**College Students (n = 18)**			**Working Individuals (n = 24)**		
	M	SD	p value	M	SD	p value	M	SD	p value
Commuting time 1	92 min	50.31	0.019	49 min	43.32	0.47	60 min	40.58	0.226
Commuting time 6	61 min	50.00		40 min	40.05		48 min	31.77	
Working time in office/school 1	373min	146.87	0.016	357 min	139.98	0,011	425 min	80.52	0.889
Working time in office/school 6	271min	165.12		296 min	126.51		427 min	68.51	
Total sedentary time 1	671 min	149.93	0.06	576 min	236.19	0.47	633 min	99.48	0.38
Total sedentary time 6	547 min	129.48		565 min	133.81		626 min	111.84	
Total sedentary time M	11.9 h	15.60		9.5 h	1.44		10.2 h	99.48	

Participants had to note the estimated sitting time reduction at work/school and at home five times. Out of 65 participants, only 37 reported a reduced overall daily sitting time, on an average of 111 minutes. Table 2 below shows statistically significant differences of all six self-recordings of those who managed to decrease their sitting time (n = 37).

Table 2. Overview of statistically significant differences exhibited by the participants (n =37) with decreased overall daily sitting time measured with nonparametric t-test (Friedman Test)

	Total Daily Sitting M		**Work M**		**Commuting time M**		**Sitting at Home M**		**TV and game**		**Computer at home**	
Self-recording	M min	M rank	M min	M rank	M min	M rank	M min	M rank	M min	M rank	M min	M rank
1	695	5.32	433	4.74	67	4.06	155	4.29	52	3.93	50	3.72
2	606	3.50	379	3.42	65	3.71	128	3.43	57	3.83	270	3.00
3	587	3.47	383	3.21	58	3.29	126	3.49	42	3.42	42	3.64
4	599	3.47	382	3.81	62	3.86	135	3.03	38	3.07	55	3.43
5	574	2.57	366	2.94	58	3.35	119	2.94	39	3.32	43	3.35
6	554	2.66	339	2.89	46	2.74	140	3.82	43	343	47	3.86
p value	0.00		0.00		0.002		0.005		0.037		0.143	

11 high school students decreased their overall daily sitting time by 135 minutes on average 12 college students by 143 minutes and 14 office workers by 65 minutes.

The participants practised the chosen strategies for reducing sitting time into their daily life for one month, which should be reflected by the time recordings. The final time recordings of TV-time and computer use showed a statistically significant correlation with walking, and 60-minute physical activity as shown in Table 3.

Table 3. Correlation of strategies to the average sitting time per individual activity (last 5 time recordings), calculated with $\chi 2$

	Strategies			
Activity	**Light physical activity (walking)**	**60-minute physical activity**	**Applications**	**In-person socialising (not via social media)**
Watching TV	0.14	0.09	0.03	
Computer use at home				0.018

Discussion

This study found that during one-month project period, two thirds of participants (37 out of 65) reduced their overall daily sitting time by 114 minutes on average. High school and college students decreased their at-school sitting time, which is likely due to changes in their school hours. High school students exhibited an increase in at-home sitting time if their at-school sitting time decreased. Office workers' workplace sitting time varied by 8 minutes on average between individual time recordings, and their at-home sitting time reduced by 30 minutes. All participants reduced their TV-time by approximately 15 minutes. Commuting time also decreased by 11 minutes on average as the participants opted for walking, taking public transportation in part of their commute or standing on the bus instead of sitting down. Other

studies (Prince, et al., 2014) report a low decrease of sitting time in groups that tried to implement regular leisure-time physical activity (*n*= 22, daily sitting time decrease is 119 minutes). In the group that took regular breaks from sedentary activity in addition to regular physical activity, the daily sitting time was reduced by 35 minutes. It is surprising that TV-time was found to be lower than established by other domestic and foreign studies. The National Health Survey (2007-2008) showed that 78 % of adults spent between two and six hours watching TV at leisure.

In the participants' opinion, walking is the most common and effective strategy for reducing sitting time. The 60-minute daily physical activity was voted second best. The pedometer was the chosen strategy of 6 participants, 4 of which found it efficient. The used evidence-based strategies showed no statistically significant correlation to the reduction of total sitting time. High and low-intensity physical activity do not correlate to the overall daily sitting time, as was often pointed out by foreign researchers (Biswas, et al, 2015; Buckley, et al, 2015). A research group of the American Heart Association reported that no amount of physical activity can reduce negative impacts of prolonged sitting on the body (Young, et al., 2016). Our study showed a correlation between physical activity and the decrease in time spent watching TV and playing computer games. The pedometer had no correlation to the physical activity of the participants and the final overall daily sitting time. The application's ineffectiveness could be attributed to its lack of orientation towards altering sedentary behaviour in the workplace and to the unclear goal setting with regards to the daily quota of steps. According to foreign researchers, mobile phone applications are likely to gain even more ground in the domain of reducing sedentary behaviour in the future as they are a very flexible and popular tool. They can be applied to greater samples of different populations (Bond, et al., 2014). As anticipated, the applied strategies did not prove efficient for reducing at-home and at-work sedentary behaviour. One of the participants conducted an interesting experiment: she began using a lift table in her workplace and reported a 30% decrease in her at-work sitting time. The effectiveness of the aforementioned strategy for office workers was validated also by other researchers (Chau, et al., 2014; Buckley, et al., 2015). The used evidence-based strategies showed no statistically significant correlation to reducing the total sitting time. Biswas et al. (2015) point out that very little research has been done to determine optimal strategies.

Conclusion

The participants assessed the project's contribution to the public awareness of the issues related to prolonged sitting as significant. Their estimation of the project's impact on their overall daily sitting time was lower and had very little impact on decreasing at-work sedentary behaviour. They acknowledged that it would be better to focus on reducing an individual's sedentary behaviour rather than trying to increase their physical activity as is the current practice. The latest studies point out that both the individual's overall behaviour and their sedentary behavioural patterns should be taken into consideration in order to effectively reduce sitting time. Both individual and community-based interventions should be proposed and evaluated.

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A MODEL FOR TELEMONITORING PATIENTS WITH DIABETES IN MODEL PRACTICES

MODEL SPREMLJANJA ZDRAVSTVENEGA STANJA SLADKORNIH BOLNIKOV V REFERENČNIH AMBULANTAH V SLOVENIJI

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Abstract

Introduction: *Diabetes is a chronic disease with increasingly high incidence rates. Accordingly, the implementation of model practices in 2011 was a welcome addition to the process of monitoring patients with diabetes in Slovenia. Despite the new approach to diabetes management, following the National Diabetes Control Strategy 2010-2020, the patient's input is still a far cry from an active and successful one, i.e. patients tend to play a passive role in the disease management process. Better patient involvement in the process of disease monitoring could be achieved through the use of modern information technology. The purpose of the paper is to present a model that has been developed in a way that allows just that.*

Methods: *The process of managing patients with diabetes through model practices was modelled, based on already-developed protocols for their monitoring, with the use of the Aris Express tool. By means of a critical analysis, we searched for ways to optimize the process in a way that allows the active involvement of patients. We developed a model of patient health monitoring which is based on a self-assessment method, using the Dex-i tool, and included a specialist diabetologist as an expert. To some extent, we have implemented the model into a software solution with a prototype approach. A critical analysis of the developed model and the web application was made in the conclusion of the paper.*

Results: *The model only incorporates the parameters that patients are able to pinpoint by themselves, without having to directly consult with the model practices. In order to add other useful functions to ensure better informing and more intensive participation of the patients in monitoring their condition, a fragment of the theoretical model was mapped to the web application.*

Discussion: *Telemedicine services can contribute to the optimal management of patients with diabetes in model practices. In their use, the active role of the patient is necessary. The possibilities of further development are seen primarily in upgrading the developed solutions and testing its usefulness in practice. With modifications, however, it could be useful for monitoring the health status of other patients with chronic diseases.*

Keywords: *dexi model, web application, diabetes management*

Izvleček

Uvod: *Sladkorna bolezen sodi med kronične bolezni, katere število bolnikov strmo narašča. Kot novost pri njihovi obravnavi so se v letu 2011 vzpostavile prve referenčne ambulante v Sloveniji. Zahteve po aktivnem vključevanju bolnikov se kljub strategiji razvoja Nacionalnega programa za obvladovanje sladkorne bolezni 2010-2020 v praksi uresničujejo v manjši meri. Opažamo, da so ti še vedno v vlogi pasivnih udeležencev v procesu obravnave. Rešitev za aktivnejše vključevanje bolnikov v proces spremljanja bolezni vidimo v podpori sodobne informacijske tehnologije in storitvah telemedicine. Končni cilj raziskave je spletna aplikacija, ki bo to omogočala.*

Metode: *Na podlagi teoretičnih osnov in popisa procesa obravnave sladkornih bolnikov v referenčnih ambulantah smo s pomočjo programskega orodja Dexi razvili teoretični model spremljanja zdravstvenega stanja. V model smo vključili tiste parametre, ki jih bolnik lahko oceni sam na daljavo. Teoretični model smo do določene mere preslikali v spletno aplikacijo in ji dodali še druge funkcionalnosti, ki lahko pripomorejo k boljši informiranosti bolnikov pri vodenju sladkorne bolezni.*

Rezultati: *Razvito rešitev smo ocenili v obliki analize SWOT. Storitve telemedicine lahko prispevajo k optimalnejši obravnavi sladkornih bolnikov v refrenčnih ambulantah. Pri njihovi uporabi pa je aktivna vloga bolnika nujna.*

Razprava: *Možnosti nadaljnjega razvoja vidimo predvsem v nadgradnji razvite rešitve in testiranju njene uporabnosti v praksi. Z modifikacijami pa bi lahko bila uporabna za spremljanje zdravstvenega stanja tudi drugih kroničnih bolnikov.*

Ključne besede: sladkorna bolezen, referenčne ambulante, spremljanje zdravstvenega stanja na daljavo, spletna aplikacija

Introduction

Diabetes is a chronic disease which, due to its frequency as well as demanding and complex treatment, represents a major public health problem (Tomažin Šporar, 2014). Due to changes in the lifestyle and aging of the population, it is expected that the personal, economic and social burden of the disease will further increase in the future (NIJZ, 2014). Tomažin Šporar (2014) warns that in order to successfully manage the disease, a coordinated functioning of the health system and the entire society is needed.

In 2011, a new method of managing patients with chronic diseases, including patients with diabetes, was implemented in Slovenia, the so-called Model Practices (MP). According to the Ministry of Health (2017), 733 such clinics operated in July 2017. The working process of the healthcare team in MP is focused on the whole spectrum of diabetes control, from the promotion of health to the management of patients with diabetes (Zaletel and Tomažin Šporar, 2013). The work is carried out in accordance with protocols, which place a great emphasis on the empowerment of the patient to become an active partner in the management of the disease (Vodopivec Jamšek, 2013).

Despite a new approach to diabetes management following the National Diabetes Control Strategy 2010-2020 (Ministrstvo za zdravje, 2010), the patient's input is still a far cry from an active and successful one, i.e. patients tend to play a passive role in the disease management process.

Patients themselves are usually in the best position to cope with their own health. In the literature (Rudel, Breskvar, Gašperšič and Vidjen, 2012), we found information that remote monitoring of the patient's health condition, when they actively cooperate, enables a faster and more efficient response of the health system to their health problems. Data that are available to healthcare professionals can be used to improve patient monitoring and treatment protocols (Komisija evropskih skupnosti, 2008).

The solution for a more active involvement of patients in the process of diabetes management in MP is therefore seen with the support of modern information technology and telemedicine services. The purpose of the paper is to present a model that has been developed in a way that allows just that.

Methods

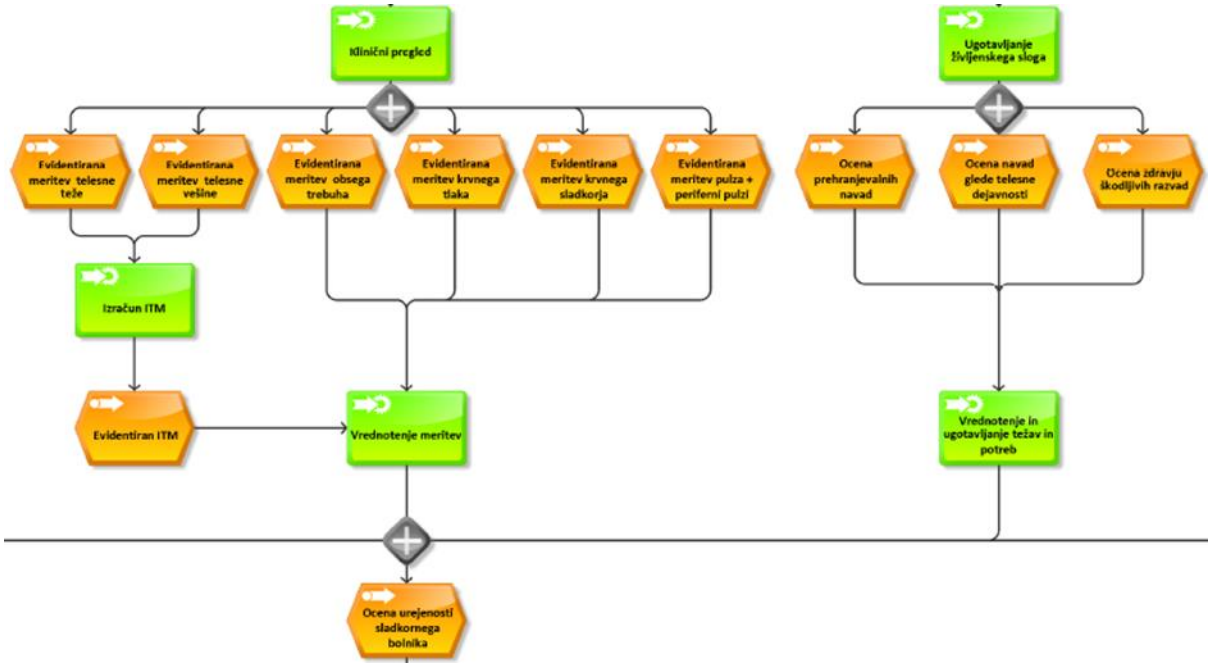
The process of managing patients with diabetes in MP was described on the basis of already developed protocols for their monitoring. We used the Aris Express tool to model the processes. With a critical analysis, we were looking for ways to optimize the process in a way that allows the active involvement of patients. We developed a model of patient health monitoring, which is based on the self-assessment method, using the computer program for multi-attribute decision making, Dex-i, and included a specialist diabetologist as an expert. To some extent, we have implemented the model into a software solution with a prototype approachA critical analysis of the developed model and the web application for the remote monitoring of health status was made in the conclusion of the paper.

Results

Process of diabetes management in model practices

The assessment of the health status of patients with diabetes, according to the protocol, covers a number of activities carried out by a registered nurse (RN) in MP. Some of these are shown in the diagram below.

In addition to activities carried out in MP, the patient should also perform certain activities outside the healthcare environment in order to achieve successful monitoring of diabetes.



Picture 1. Part of the management process for patients with diabetes in model practices

Critical analysis of the diabetes management process in model practices

We focused on those steps in the process of diabetes management where the support of information and communication technology could provide more active inclusion of the patients and, in thus, motivate them to participate. We recognise this possibility in the following steps:
- the records of self-measurements of the health parameters is poorly managed by the patients;
- these records are in paper-based form, so healthcare professionals often do not have access to them, or they are limited to the location and time in MP;
- the assessment of the health status is mostly based on the data of current measurements and health status of the patient does not include data from the past;
- in determining the characteristics of the patient's lifestyle, the data is obtained by an unstructured interview, which requires a lot of time, also the answers are difficult to interpret;
- the health environment often puts the patients into a stressful position;
- RN are focused more on the data obtained by performed measurements, and less on the patient's lifestyle data;
- the protocol provides one visit to the MP annually, which raises the question of the continuity of monitoring;
- patient education is temporally and locally limited to MP;
- the applied health education methods place the patient in the role of a passive listener;
- the patient does not take part in setting up health education goals.

Theoretical model for telemonitoring patients with diabetes

Those steps in the process that can be performed by the patient outside the health system were included in the theoretical model for telemonitoring the diabetes patients' health status (hereinafter referred to as the model). The model is based on the patient's self-assessed parameters, which are an important indicator of diabetes management.

The model was created using the Dex-i multi-parameter decision-making tool, based on the decomposition of the decision-making problem into smaller sub-problems (Jereb, Skok, Šafran and Škornik, 2011). In our case, the decision-making problem is the regulation of the patient's health condition connected to diabetes.

The health status was broken down into individual parameters (Picture 2) and we included an expert - diabetologist in their choice. Finally, the self-assessment of the health status was obtained through the process of grouping the related parameters.

Parameter	Opis
Samoocena ZS	Kako bi ocenili svoje zdravstveno stanje v povezavi s sladkorno boleznijo?
Vitalni znaki	Kakšne so vrednosti samomeritev vitalnih znakov?
Krvni sladkor	Kakšne so vrednosti samomeritev krvnega sladkorja?
Na tešče	Koliko je vrednost samomeritve krvnega sladkorja na tešče?
Po obroku	Koliko je vrednost samomeritve krvnega sladkorja 2 uri po obroku?
Pred spanjem	Koliko je vrednost samomeritve krvnega sladkorja pred spanjem?
Krvni tlak	Kakšne so vrednosti samomeritev krvnega tlaka?
Zjutraj	Koliko je vrednost samomeritve krvnega tlaka zjutraj?
Zvečer	Koliko je vrednost samomeritve krvnega tlaka zvečer?
Telesna masa	Kakšne so vrednosti samomeritev povezanih s telesno maso?
ITM	Koliko je vrednost indeksa telesne mase (ITM)?
Obseg pasu	Koliko je vrednost samomeritve obsega pasu?
Način življenja	Kako bi ocenili svoj način življenja?
Življenjski slog	Kako bi opisali svoj življenski slog?
Telesna aktivnost	Kakšne so vaše navade povezane z telesno aktivnostjo?
Pogostost	Kako pogosto ste telesno aktivni?
Intenzivnost	Kako intenzivna je vaša telesna aktivnost?
Prehrana	Kakšne so vaše navade povezane z prehranjevanjem?
Način	Kako bi opisali svoj način prehranjevanja?
Št. obrokov	Koliko obrokov hrane zaužijete dnevno?
Raznovrstnost	Kako bi ocenili raznovrstnost vaše prehrane?
Skupine živil	Kako bi ocenili prehranjevalne navade glede na posamezne skupine živil?
S&Z	Kako pogosto uživate sadje in zelenjavo?
Žita	Kakšne vrste kruha, žit in žitnih izdelkov v povprečju najpogosteje uživate?
Maščobe	Kakšne so vaše navade povezane z uporabo maščob v prehrani?
Sol	Kakšne so vaše navade povezane z uporabo soli v prehrani?
Razvade	Kakšne so vaše navade v povezavi z zdravju škodljivimi razvadami?
Kajenje	Kako bi opisali vaše navade v povezavi z kajenjem?
Alkohol	Kako bi opisali vaše navade v povezavi z uživanjem alkoholnih pijač?
Psihološko	Kako bi ocenili vaše psihološko počutje?
Stres	Kako bi ocenili stopnjo vaše podvrženosti stresu?
Razpoloženje	Kako bi ocenili vaše razpoloženje?
Počitek	Kako bi ocenili vaš počitek/spanje?
Ostalo	Kako bi ocenili ostale dejavnike, ki vplivajo na urejenost sladkorne bolezni?
Simptomi	Ali so pri vas prisotni simptomi sladkorne bolezni?
Zapleti	Kako bi ocenili svoje stanje zapletov sladkorne bolezni?
Kronični	Ali so pri vas prisotni kronični zapleti sladkorne bolezni?
Hipoglikemije	Kako bi ocenili svoje zaznavanje in ukrepanje ob pojavu hipoglikemije?
Zaznavanje	Ali zaznate simptome hipoglikemije?
Ukrepanje	Ali imate znanje za ukrepanje ob pojavu hipoglikemije?
Opolnomočenost	Kako bi ocenili stopnjo svoje opolnomočenosti?
Samooskrba	Kako bi ocenili svojo sposobnost samooskrbe?
Samokontrola	Ali izvajate samomeritve krvnega sladkorja iz razumete izmerjene vrednosti?
Samovodenje	Ali znate ukrepati na osnovi izvidov samokontrole?
Edukacija	Kako bi ocenili svojo znanje in veščine povezane s sladkorno boleznijo?

Picture 2. Tree of criteria - Self-assessment of the health status of a patient with diabetes

Each parameter was determined by the stock of good, neutral and bad values. By defining the decision rules, we carried out the values that describe the health status by individual groups of parameters or the final assessment of the patient's health condition connected to diabetes.

Transfer of the theoretical model into a web application

The model represents a conceptual basis for developing a web application for monitoring the health status of patients with diabetes, intended for use in the home environment. For this reason, in the development of the model, only those parameters whose values can be measured or evaluated by patients themselves were included. The basic idea of the model is that patients, using objective criteria for the management of diabetes which are accepted by the profession, subjectively assess their health status, depending on the given possibilities of answers, or enter numerical measurements that are further evaluated.

Picture 3. Web application self-assessment of parameter Glucose level (own resource)

The self-assessment of the health status in the web application is carried out using questionnaires based on the parameters and stocks of the values used in the theoretical model. The parameters whose stock values are numerical are written down by patients on the basis of performed day-to-day measurements (Picture 3). Other parameters are evaluated by patients by choosing the options already given, depending on which descriptive value best suits their current health state or behaviour (Picture 4).

Picture 4. Web application self-assessment of parameter Nutrition (own resource)

On the basis of the data entered in the questionnaires, patients receive automatic feedback on the self-assessment of their health status according to the sum of the points of the answers they have given. Each answer in the web application is numerically evaluated.

Discussion

In order to monitor diabetes, patients are already keeping records of health status parameters in the form of self-care diaries. The developed application can serve as an electronic self-care diary. Data is therefore easily accessible to healthcare professionals; for them access is not limited to a specific location and time. Since data are kept in electronic form, this facilitates their processing and enables a graphic display; thereby focusing on parameters that deviate from target values is easier.

In the model, the presented method of assessing health status by individual parameters enables a systematic overview of complex data and their simpler interpretation. The final value provides a guidance value to patients in terms of feedback on their health status. An inadequately assessed health status can motivate the patient to behave in a way that would make them healthier.

The acquired data serve as a support to healthcare personnel when deciding on the patient's further disease management and treatment. Due to numerous data, their decisions are more informed and justified. Monitoring the data over a longer period of time provides a clearer picture of the patient's health status and a more detailed annual assessmentThe online application enables the gathering of information about the patient’s lifestyle and other factors that impact the management of diabetes in the form of structured online questionnaires. The information obtained in that way saves the time that the RN uses for their gathering. Patient responses are processed and graphically displayed, which allows that the RN focuses on those data that deviate from the desired values and in this way acquires additional information about

the current state. In the case of achieving the desired values, the RN motivates the patient to maintain their existing condition.

The patient gives health information from their home environment, where they feel safe. In this way, the impact of stress that can be caused by the health environment is reduced.

The management protocol provides one control visit to the MP annually. The time between individual visits represents a lack of data and the possibility of worsening the health condition without an adequate response from the healthcare system. Inadequate values of the health parameters might not harm the patient at the moment and they might not even understand their meaning, but with time they can cause chronic complications of diabetes. The web application enables the patient's daily communication with the health system, so the adequate response can be quicker.

Web application is designed more widely, not only as an application that would allow data entry and monitoring, but also as a source of information for patients with diabetes. We added the knowledge base with health education content and online links with useful information for the patient. In that way education is no longer limited to the place and time in the MP. This method of searching for information requires a patient to assume an active role and not only appear as a passive listener. When reading information about their disease, the patient sets their own health education goals and the way to achieve them.

Conclusion

A web application is a tool that requires an active inclusion of the patient, since they are the ones who enter the data or search for information about the disease. The renewed process in the MP is carried out in such a way that we transferred the defined part of the process to the patient as an equal member and motivated them to participate in the process. With their involvement, we expect improvements in the monitoring of their health status.

Feedback given to the patient serves as an incentive or critique on the path to achieve good management of the disease. The solution can be upgraded with even more feedback that is individualized and not limited to the time and location of the MP.

The subjectivity of the self-assessed health status of the diabetic patient in the desire to reach the target values can lead to incorrect conclusions. Remote health monitoring therefore cannot replace disease management with direct contact with a patient in the MP.

A significant contribution to the use of ICT is seen in their use in monitoring the health status of patients with chronic diseases. Due to the nature of their illness, they need long-term follow-up and quick reaction if their health condition worsens. By modifying and adding specific parameters to be monitored for a particular chronic disease, the web application would be suitable for monitoring the health status of patients with other chronic diseases.

The application is not necessarily intended only for patients who are managed in a MP, but also for all patients with diabetes monitored in a general practice or in hospitals.

We believe that with this method we can enable a more active involvement of the patient with diabetes in the disease management process, thus ensuring that they take responsibility for their own health. At the same time, in this way, we facilitate access to patient data by health professionals, thus optimizing the process of monitoring, management and treatment of diabetes.

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COMPUTER designed surgical guides for dental implant placement / CASE REPORT

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Abstract

Introduction: *Implant surgical guides are prosthetically driven acrylic devices necessary for the surgical dental implant placement. Surgical guides are used to transfer dental implants into the pre-planned implant location in the alveolar bone. The current state-of-the- art computer-guided procedures allow optimal implant placement, shorter surgical times, less invasive procedures, and reduce postoperative complications.*

Methods: *The main source of information for this paper was provided by the recently published scientific articles and textbooks from the field of laboratory prosthetics and surgical implant placement. Surgical guides were designed and manufactured in a digitalized dental laboratory, in cooperation with the prosthodontist and surgeon.*

Results: *The digitally designed and manufactured surgical guides allow complete guided insertion of dental implants into the alveolar bone. Based on the surgical and prosthetic scheme, the guide is designed in the 3Shape Implant Studio computer programme and printed using a stereolithographic 3D print technology. This article describes the design and fabrication procedure of surgical guides for guided implant placement using contemporary digital technology. The purpose of the paper is also to present the interdisciplinary approach of laboratory dental technicians, prosthodontists and oral and maxillofacial surgeons in the design and implant-prosthetic restoration.*

Conclusion: *Planning and coordination of dental team contribute to a high quality and precise surgical procedure of implantation, which provides functional and aesthetic prosthetic rehabilitation. The surgical guide manufactured using computer technology enables the implementation of dental implants in the most appropriate position according to the diagnosed bone conditions with three-dimensional X-ray imaging (CBCT), thus exposing the patient and surgeon to minimally invasive procedures. Therefore, the prosthetically planned insertion of dental implants allows the full prediction of final prosthetic outcome.*

Keywords: *implant surgical guide, computer-aided process planning and manufacture, 3D printing*

Introduction

Nowadays it is becoming increasingly common to use prosthetic care with dental implants to replace the missing teeth. The development of new forms and surfaces for dental implants brings new possibilities for patients. This is reflected in an ever wider indication of their use for partially as well as completely toothless patients, the patients with a largely reduced ossein and those in whom until now there has been no indication for a dental implant due to difficult access (Widmann, Bale, 2006).

It is important to plan the placement of the dental implant so that the entire implant is placed in the alveolar bone. If there is not enough own ossein to envelop the entire surface of the implant, the missing part of the ossein is replaced with a bone transplant or artificial bone. When inserting the dental implants, it is important to use caution not to damage other anatomical structures, such as the mandibular nerve in the lower jaw, the bottom of the maxillary sinus in the upper jaw or the roots of adjacent teeth. The dental implant must be designed and inserted in the area, which enables the appropriate manufacture of a prosthetic construction (Brief et al., 2005). The insertion of dental implants based on 3D computer imagery enables a better evaluation of the patient, a better overview of the ossein area, better prosthetic planning and excellent chances of anticipating the course of the treatment process. Compared to usual techniques, like a clinical preoperative evaluation, which includes a visual examination, palpation and two dimensional (2D) radiographic photographs, the technology has developed in the direction of computer three dimensional (3D) planning (Orentlicher, et al., 2012; Turkyilmaz, Suarez, 2009). Cone beam computer tomography(CBCT) was developed in dental practice due to arising need for more accurate facial structure definition, which is not captured in classic CT scanning (Hilgers, Tracey, 2004). The pictures obtained through CBCT technology are of higher quality, they are more distinct, and contain more data, which offers more detailed information for the surgeon as well as the entire team (Ganz, Scott, 2013).

The purpose of implant-prosthetic rehabilitation is to ensure a functional and permanent prosthetic patient care, which is conditioned upon the correct placement of dental implants in the jawbone. To ensure the correct position of designed dental implants, we can use a prosthetically designed surgical guide, which allows the surgeon to determine the proper direction and angle of the placement (Lee, et al., 2014). With new technologies new forms of surgical guides have been developed, yet the biggest change in planning surgical guides was introduced with the use of computer systems, such as CAD/CAM in implant prosthetics and in the use and manufacturing of surgical guides. The importance of a good design and the correct placement of dental implants for prosthetic manufacture has been known for years. The purpose of computer-guided manufacture enables a more precise and faster care (Poltras in Pena, 2016). Planning the rehabilitation with dental implants includes a precise preoperative clinical examination of the patient and X-ray photograph analysis. The prosthetic design is the basis for the manufacture of the surgical guide, which is designed and transferred to the exact surgical position from the CBCT image and the joint analysis in the computer programme (Van Steenberghe, et al., 2005).

The surgical guides are manufactured mostly with the intent of better anticipating the procedure and the end result of the insertion of one or more dental implants. They should enable good stabilization and rigidity in partial or complete toothlessness. They must be custom-made to fit each patient individually, using the correct transparent material (Orentlicher, et al., 2012). Kochhar and Ahuja (2015) cite three types of surgical guides, which offer a precisely guided insertion of dental implants: a surgical guide supported by teeth, a surgical guide leaning on mucosa and a surgical guide supported by bone. After all the necessary data are provided (information about the anatomy or the ossein, its quantity, information about the process of manufacturing the dental substitute), dental implants can be planned using a computer in a virtual environment so that any complications during the manufacture and insertion of prosthetics can be prevented. The optimal position of dental implants has a positive effect on the final look of the prosthetics, its function, aesthetics and speech of the patient (Hultin, et al., 2012). It is important that the surgical guide is made precisely, robustly and rigidly enough while being able to withstand the sterilization process. To meet these standards, most surgical guides aremanufactured with the help of stereolithography. With the use of computer technology, it is necessary to ensure strength in critical areas, such as screw placement, by using special metal guides, made from stainless steel or titanium, which prevents damaging the screw hole while using the surgical guide. To prevent deformations due to the sterilization process, surgical guides are sterilized using low temperature methods, such as using formaldehyde and ethylene oxide (Bibb, et al., 2009). Stereolithography is a fairly new procedure in dental prosthetics and enables the manufacture of surgical guides based on 3D design. When using stereolithography, the product is only polymerized to 80 % in the device, the remaining 20 % is done afterwards under strong ultraviolet light in a specifically purposed apparatus (Lal, et al., 2006). Computer guided manufacture of surgical guides represents a perfect solution from virtual design to prosthetic rehabilitation, which makes the entire process quick and efficient. It is extremely important to make sure that the surgical guide is correctly placed in the patient's mouth in order to ensure the correct position of dental implants according to the design (Komiyama, et al., 2011). The guides represent an excellent accessory to dental implant insertion, especially when they are manufactured using computer technology. The latter allows the planning of precise positions of dental implants beforehand on the basis of a clear CBCT image, virtually made future dental coatings and endless possibilities of product examination on a computer screen in all three dimensions of space, i.e. buccolingual, mesiodistal and apico-coronal direction (Mandelaris, et al., 2010).

Methods

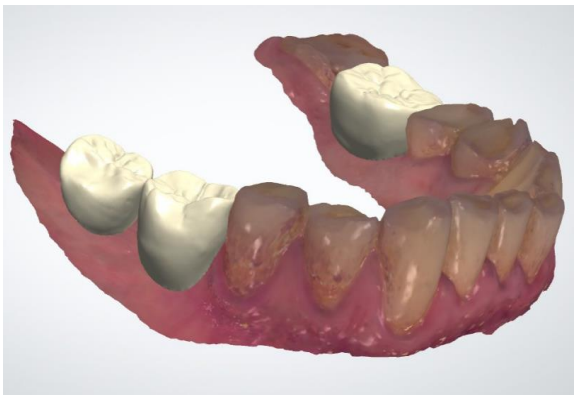
A literature review surveying books, scholarly articles, and any other sources relevant to the issue was conducted. The literature was searched in libraries and professional databases, such as PubMed, Medline, EBSCOhost, etc., including domestic and foreign professional works. The following key words and phrases were employed: CAD / CAM, surgical guides for the insertion of dental implants, implantology, clinical cases of implantation of dental implants with surgical guides, digitally manufactured surgical guides, etc. The product presented in the article was manufactured in a laboratory with the expert help of a dentist and a maxillofacial surgeon.

Results

A computer designed surgical guide that enables complete guidance of dental implants was manufactured. A 50 year-old man, with no history of tobacco use is being treated at the Division of Stomatology in Ljubljana. On the day of the first consult, he had all the teeth in the upper jawbone, while three molars were missing in the lower jawbone (Picture xx). During the examination, no systemic diseases in the oral cavity were detected. The surgical implant was made for this patient because of shortened dental lines on both side areas in the lower jawbone. On the patient's right side, there were two missing teeth (46 and 47). On his left side, the missing tooth was 36. The plan of prosthetic care included the insertion of three dental implants, each of which would carry the prosthetic construction individually. Considering the correct placement of the three dental implants is crucial for the suitable occlusal rise (this would be carried out during the process of healing after the insertion of dental implants) and the functionally and aesthetically manufactured prosthetics. It was, therefore, decided to insert the dental implants in the lower jawbone using computer technology, based on the patient's wishes and the consultation with the dentist and the maxillofacial surgeon. For computer-guided operation, it is necessary to make a perfectly guided surgical guide. The manufactured surgical guide, based on the plan, would enable a perfectly guided insertion of dental implants in the pre-planned positions. The system CAD/CAM was used to design the surgical guides. The program 3Shape Dental designer Premium was used as the CAD unit, the 3Shape Implant Studio as the module for making the surgical guides and a 3D printer (stereolithography) by DWS Systems, DWS-LAB 020D was used as the CAM unit. Through CBCT imaging, a 3D image of the craniofacial area of the patient with all structures necessary for examination was obtained. An intraoral image of the state of the patient's mouth can be performed classically or, as in our case, digitally with the help of intraoral scanning. By using a digital intraoral print, it is possible to immediately input virtual data into the programme for the manufacture of the surgical guides, where the data are shown on screen in 3D and can be suitably edited.

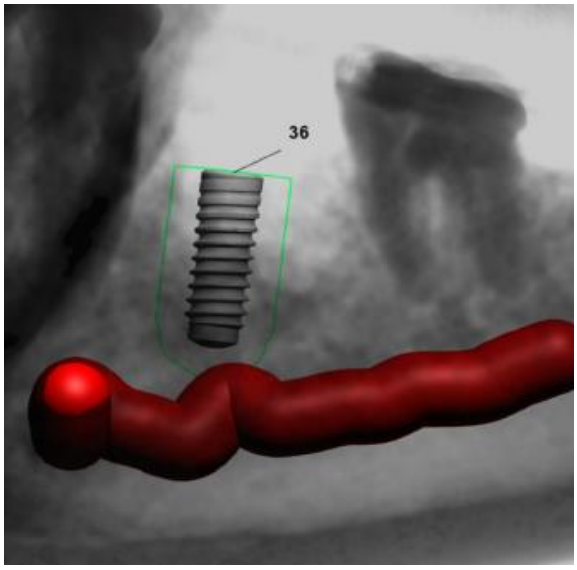
The patient's first consultation was in December 2016. Using an intraoral scanner 3Shape Trios, an optical intraoral image of the state of his mouth was performed, aligning with the CBCT image (Picture 1).

Picture 1. Aligning the intraoral image with the CBCT image

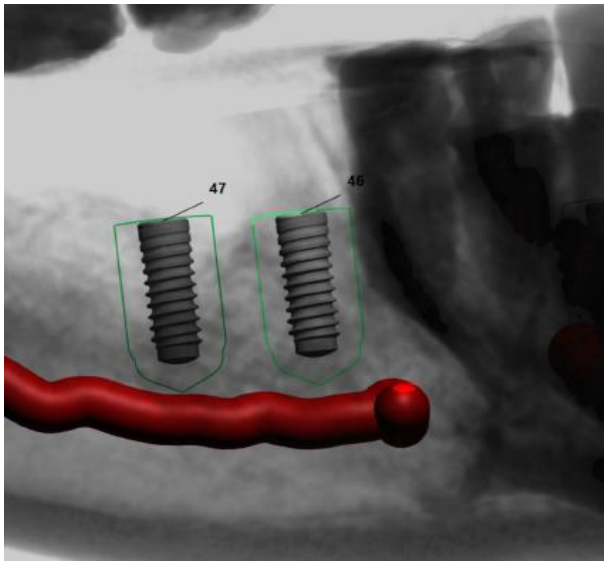


Picture 2. Side view of diagnostic model

In the beginning of the procedure, it is necessary to make a virtual diagnostic model of future teeth in the defect sites and to examine the needed space, future articulation and occlusion. This also helps to plan the position of dental implants in order to better determine their angle and avoid possible complications in the process of prosthetics manufacture. The virtual diagnostic modelling of future dental prosthetics is presented in Picture 2. The virtual diagnostic model is shown in Picture 2. In the second part of the process, it is necessary to mark critical anatomic structures to avoid them while placing dental implants in order to prevent damage and future complications. On the basis of measurements of ossein, free for implant insertion, we decided to use Straumann dental implants. They were chosen in regards to the ideal spot for future prosthetics as well as adjacent teeth and anatomic structures. For the dental implant in position of the tooth 36 (Picture 3) and in positions of teeth 46 and 47 (Picture 4), we chose an implant with a 3.3 mm radius and 10 mm length. In virtual planning, we chose a 2.0 mm apical security zone, which is necessary to completely bypass vital anatomic structures. Despite the surgeon's preference for a longer dental implant, this was not possible due to the direct proximity of a nerve. The radial security zone was set at 1.5 mm by default, which was suitable for this case. The chosen dental implant enables a good upgrade and is planned at an angle allowing an unrestricted insertion and screwing of the prosthetic substitute. In position 46 on the right side, the ossein was more favourable, while in position 47 the correct placement of the dental implant was slightly obstructed due to an uneven resorption of the alveolar ridge. In the next phase, we chose metal tubes or guides that enable complete guidance of the drill's depth and angle. For the insertion of all three implants, we chose Straumann guides, standard 5 mm diameter, made of stainless steel.



Picture 3. Virtually positioned dental implant in position 36

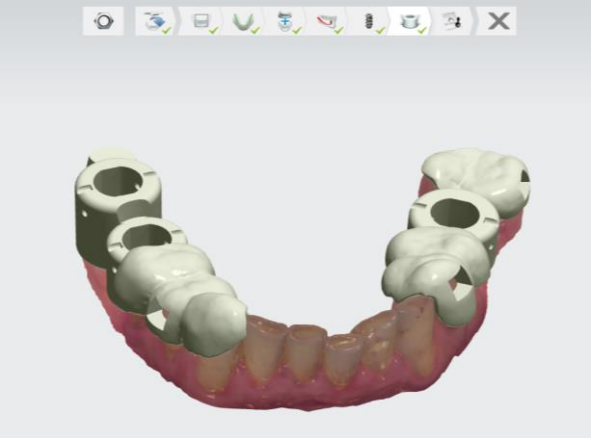


Picture 4. Virtually positioned dental implants in positions 46 in 47

When the final placement of the planned dental implants is satisfactory, the plan is saved, and a surgical report is printed. The latter precisely determines the position of dental implants and the brand, shape and size of the chosen implants, according to the plan. Such a surgical report is a prerequisite for a precise and quality insertion of dental implants using a surgical guide, which the surgeon uses during the insertion procedure. The programme leads us to make the

surgical guide, which is initially made by the programme itself. In the programme, the number of teeth supporting the guide is determined. In the case presented, we opted for a divided guide to ensure better stability. On both sides of mandible, the guide leans on three adjacent teeth. At this point, it is possible to recheck the direction of the insertion (Picture 5). The following surgical guide can be edited at one's choice, so that the structures needed by the surgeon during the insertion are visible. The so-called windows or openings are created, where the surgeon can check the correct position of the guide before the insertion of the dental implants (Picture 6).

Picture 5. Designing the surgical guide and insertion direction



Picture 6. Computer generated surgical guide with openings

After the computer-aided surgical guide has been fully virtually designed (Picture 6), the guide needs to be saved and confirmed. At this point, the computer finishes the execution and creates a STL file to print. After this stage, no further changes to the design are possible. The STL file is generated as a combination of multiple layers, which the 3D printer will print in a specific order, thus creating the entire surgical guide. After the printing began, the entire process lasted for about 60 minutes. The end result is shown in Picture 7. The surgical guide was used for the insertion of dental implants in the lower jawbone at the Maxillofacial Surgery Clinic in Ljubljana. The guide was well stabilized on the adjacent teeth during the operating procedure and the implants were inserted as planned (Picture 8).

Picture 7. Completely polymerized surgical guides before mechanical treatment

Picture 8. Surgical guide, placed in the mouth before the operating procedure

Discussion

Modern technology facilitates the choice of suitable dimensions and positions of dental implants, which increases the effectiveness of the entire participating team. Surgical guides must be carefully prepared to ensure the best stability in the mouth during the operation. They are custom-made, usually from acrylate and must ensure proper stabilization and rigidity (Ortentlincher, et al., 2012). There are three types of surgical guides, depending on the support in the mouth. The guides supported by teeth or bones offer the best stabilization. As guides, which lean on the mucosa, do not offer similar stabilization, it is necessary to fixate them with screws, attached to the bone. In case of a completely toothless alveolar ridge, guides can be stabilized during the procedure with smaller screws in the alveolar bone in places where the insertion of dental implants is not planned. In the presence of the patient's own teeth, guides can be stabilized on these teeth or else lean on oral mucosa. They are always planned in such a wayso that they do not obstruct the surgeon's work during the open operating field (Kochhar, Ahuja, 2015).

When planning a computer guided surgical procedure using a surgical guide, important anatomic structures (veins, nerves, paranasal sinuses) must always be taken into consideration (Hoffmann, et al., 2005). The angle in the mesiodistal direction is determined by adjacent teeth and the prosthetic upgrade, while in the vestibule-oral direction, the angle of the implant is also determined by the width of the jaw ridge (Petelin, et al., 2011). It is recommended that it is separated from adjacent teeth by at least 1.5 mm (Hoffmann, et al., 2005), while the distance between two implants should be 3 mm. Such a distance renders sufficient blood circulation of the ossein possible. The smallest recommended distance between the implant and the channel of the lower alveolar nerve is 2 mm. The implant should be at least 1 mm apart from the cavity in the upper jawbone and the nasal base (Petelin, et al., 2011). There are also guides that serve as an accessory for the insertion of a dental implant without the removal of the mucosal lobe during a flapless surgery, which reduces the potential complications during and after the procedure. The planning and manufacture of such a guide is done entirely with computers (Abboud, Wahl, 2009). A high success and survival rate of dental implants as reported in the published studies show that substituting teeth with dental implants is a reliable method, which is effective in the long term (Allen, et al., 2006). The treatment with two dental implants has become almost a standard care of partially and completely toothless patients with a resorbed alveolar ridge, mostly in the lower jaw. The use of dental implants in the world shows a 15 % increase in the last few years and is expected to rise in the near future (Kumar, et al., 2016). In the field of X-ray photography, new technologies were developed in the last decade. The research by Suomalainen et al. (2008) confirms that CBCT photography of facial structures is more precise and informative for the planning of the placement of dental implants compared to a classic CT. This is the reason why CBCT photography has become the standard for most insertions of dental implants. With the help of these procedures and by manufacturing surgical guides, the planning and insertion of dental implants is becoming more and more precise and safe (Maeda, et al., 2008).

Sarment et al. (2003) compared the precision of a classically made surgical guide to a computed planned guide, constructed by using stereolithography. They found that the difference between the planned angle of the insertion and the actual position in the mouth with the classical guide was 8 degrees, while with the computer planned surgical guide it was 4.5 degrees. In the computer-assisted planning process of the operating procedure with a surgical guide, the deviations were minimal. They concluded that the use of a computer planned surgical guide is important, precise and reliable, whereas the guide is a good accessory to any surgeon, especially those with less clinical experience.

Conclusion

The manufactured surgical guide enables a perfectly guided insertion of dental implants into the jawbone. The article presents the manufacture and the procedures including the use of modern technology, which is still gaining ground in Slovenia. We have shown the benefits of manufacturing and using such guides to insert dental implants and raised awareness to the importance of good communication during planning and implant prosthetic care. Since precision and quality of surgical and prosthetic part of the implant prosthetic care are extremely important, this article explains a digitally guided procedure of manufacturing surgical guides.

According to the overview of literature and the process of manufacturing the guide, it can be concluded that the use of computer technology in implantology as well as dental prosthetics is justified, since it enables better precision, quality and predictability of the procedure, which prevents complications. A correctly prepared surgical guide makes a surgeon's job easier, while the correct placement of implants facilitates the work of the dental prosthetist, resulting in the best possible design of the prosthesis, better aesthetics, and optimized function.

In dental prosthetics as well as in other branches of dentistry, an improvement of technology which is based on 3D planning and execution, is expected. As a result, it will take less time to make prosthetic substitute which will be also more precise. While the technology may be advancing, it remains the responsibility of dental specialists to assure the quality of products, regardless of the technology used in patient care.

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AN EVOLUTION OF ONLINE THERAPY APPROACH IN APPLIED PSYCHOPHYSIOLOGY – BIOFEEDBACK AND NEUROFEEDBACK

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Abstract

Introduction: *Biofeedback refers to a technique that is used to control body functions such as muscle tension and heart rate, while Neurofeedback refers to controlling and training our brain waves. Biofeedback and neurofeedback technology enables us to measure and treat various physical and mental health issues.*

Methods: *Therapies used to mostly be conducted in a practitioner's office, but now that some versions of this technology have become more user-friendly, they are appropriate for home use also. Internet and mobile devices enable therapists to direct the course of therapy online in real time or monitor the results of the client's sessions after the session.*

Results: *In this article the authors describe the evolution of transition from office-based therapies to online therapies and identify the key advantages and disadvantages of such an approach compared to the classical biofeedback therapy setting. We compare two single case studies.*

Discussion: *The pitfalls and potentials of the online therapy approach and its use in the future are outlined.*

Keywords: *biofeedback, neurofeedback, online therapies, applied psychophysiology*

Introduction

Biofeedback refers to the technique that is used to control body functions such as muscle tension and heart rate, while Neurofeedback refers to controlling and training our brain waves. Biofeedback and neurofeedback technology enables us to measure and treat many physical and mental health issues by using biofeedback devices and psychophysiological sensors. These sensors measure the psychophysiological responses in our body and create a biofeedback loop. Instruments give feedback to the user in real time in conjunction with the changes in thinking, emotions and behaviour. They also support the desired physiological changes (Schwartz and Andrasik, 2017).

Biofeedback therapy as a mind and body concept has been used for several hundred years. Claude Bernard introduced the concept of homeostasis in 1865 (Cooper, 2008) and in 1885, J.R. Tarchanoff demonstrated that we could consciously control our heart rate. In addition, other scientists also contributed and gave scientific support to biofeedback therapy, such as Frederic Skinner, Maia Lisina and George Mandler (Peper and Shaffer, 2010). In 1969 they

established the first biofeedback society – Association for Applied Psychophysiology and Biofeedback (AAPB) that contributed to the development of different therapeutic modalities, and professional and home biofeedback devices.

Health care practitioners are now using professional biofeedback devices and complex software. In order to use the technology effectively, therapists need extensive training in the field (BCIA.org, 2018). Prior to the computer and internet era, home training with professional multichannel biofeedback and neurofeedback devices was not possible because devices and biofeedback systems were not user friendly, and sensor and software technology were not sufficiently developed. In addition, clients and therapists did not have any means to connect and transmit the data and communicate with each other at the same time. Practitioners first encouraged their clients to use small analog one-channel biofeedback devices, such as HRV, EMG biofeedback, thermal biofeedback, and GSR biofeedback, as home training devices that facilitated professional biofeedback training therapy (Schwartz and Andrasik, 2017). Usually these devices were very basic and could be used independently without a computer; most of them were first developed in the early 1970s, (Siever, 2008).

With the development of computer technology, software and greater precision of sensors, complex algorithms, smart devices and wearables, online therapist-guided bio/neurofeedback therapies can be conducted in clients' homes instead of in a therapist's office. Another relevant neurofeedback software is Mindlift (Home Neurofeedback | Myndlift, 2018), which uses the neurofeedback device Muse (Muse: the brain sensing headband, 2018). There are several different concepts and solutions on the market for online bio/neurofeedback sessions. With these devices clients can learn to regulate their bodies and brain activity resulting in improved psychoregulation, lowered stress level and improved cognitive performance. These concepts enable clients who live far away from the practitioner's office to have access to professional biofeedback therapy. These kind of solutions are also helpful for clients who have motoric disability or lack the time to visit the therapist's office regularly.
Moreover, we have also been witnessing the rise in popularity of non-professional home biofeedback devices and apps for iPhones and android systems that present a unique challenge for the biofeedback profession, as stated in the AAPB document about biofeedback standards. They suggest that home devices intended to be used by the general population should contain detailed instructions of how to use the device. AAPB also advises that educators and biofeedback professionals educate the creators of such apps and biofeedback solutions about the usefulness of their invention for the target audience (AAPB, 2018).

With regard to the above facts, the key advantages and disadvantages of the online biofeedback therapies approach compared to classical biofeedback in-office therapy setting should be examined.

Methods

Two cases comparison report

Patient X was a 6 year-old girl with spastic cerebral palsy from brain damage and suffered multiple epilepsy seizures a day, as well as having minor movement problems and difficulty with thinking. She attended a special preschool program for children with mild mental development delay. Her wording was poor, she was not speaking well and she had also symptoms of ADHD.

Patient Y was a 38 year-old man with mixed ataxic and spastic cerebral palsy which was caused by brain damage that occurred in a car accident at the age of 6. He also suffered from several epilepsy seizures a day as well as movement, posture, balance and coordination problems. In addition, he also exhibited a mild intellectual disability, impulsivity and impaired concentration abilities.

In both cases, the main goal of the neurofeedback therapy was to reduce the quantity of epileptic seizures. We designed specific neurofeedback protocols for both clients after the quantitative EEG diagnostic was made.

The therapy plan consisted of 60 hours of neurofeedback therapies – 2 hours per week. Both clients did the first 30 hours of therapy in a practitioners' office with a neurofeedback therapist. Patient Y did all 60 hours of therapies in an office setting. Client X lived 120 km form the therapist's office and the weather conditions did not always allow for a safe trip to the office, so we decided to try online neurofeedback therapy.

Client X then did the second 30 hours of neurofeedback therapy in her home and was connected to a neurofeedback therapist online. The therapist directed the protocol and applications for neurofeedback sessions. Since this was the first online case for our neurofeedback office we used the commonly available software – Skype (Anon, 2018) and TeamViewer (TeamViewer.com, 2018) for communicating and connecting to our client's computer.

Client X's caregiver – the girl's mother - was briefly educated about bio/neurofeedback therapy and correct electrode placement, so that she could perform neurofeedback therapy at home with the therapist directing, controlling and reviewing the sessions via an online connection to the client's computer. For this purpose, the professional Nexus 4 device and BioTrace software were used (MindMedia BV, 2017), while the therapist in the neurofeedback office was using the professional Nexus 10 biofeedback device with BioTrace software (MindMedia BV, 2017).

The purpose of this research work was to study the benefits and downfalls of the online neurofeedback therapy approach compared to office-based setting therapy.

Materials

We created a review questionnaire chart where we established 5 quality categories (time, costs, therapy efficiency, motivation and challenge) with relevant statements that could explain

important factors when we are considering if online neurofeedback therapy is a feasible approach for the benefit of our clients and the success of neurofeedback therapy.

All the statements were evaluated by means of a comparison to the outcomes of specific therapies for both cases (X – online therapy and Y – office-based therapy), according to binary classification summary (YES or NO), from the information gathered by our therapist during and after the therapies.

Table 1. Statement comparison chart: Office-based therapy case – Online therapy case

Statement	Office- based therapy - X	Online therapy - Y
I. TIME		
1. Time spent for one therapy hour (commuting + therapy) is more than 2 hours.	YES	NO
2. One hour of therapy can be divided into a morning and afternoon session if the patient is more tired than usual.	NO	YES
3. Client can have therapies regularly (no holiday breaks).	NO	YES
4. Client can have more than 2 therapies per week for the purpose of enhancing neuroplasticity.	YES	YES
II. COSTS		
5. The cost of the therapy is 30% cheaper than average cost of office-based psychological or psychophysiological office-based therapy.	NO	YES
III. THERAPY EFFICIENCY		
6. Neurofeedback therapy reduced episodes of epileptic seizures.	YES	YES
7. Neurofeedback therapy helped prevent the occurrence of epileptic seizures for more than 7 weeks.	NO	YES
IV. MOTIVATION		
8. Clients motivation to participate at the neurofeedback sessions was relatively stable throughout the 60 hours of therapy.	NO	YES
9. Caregivers motivation to proceed with neurofeedback sessions till the end of the 60 hours therapy was relatively stable.	YES	YES
V. CHALLENGE		
10. Office-based therapy is challenging for the clients.	NO	NO
11. Office-based therapy is challenging for the caregivers because of commuting.	YES	YES
12. Neurofeedback therapy requires basic knowledge of electrode placement and computer knowledge for the caregivers.	NO	YES

Results

We constructed a statement comparison chart to examine the benefits and downfalls of online therapy compared to office-based therapy. In the first category – TIME, we created a statement if time spent for one hour of therapy (commuting + therapy) takes more time than 2 hours. It was true for the office-based case (Y), but not for online therapy case. All other 3 statements about time were positively evaluated (YES) for the online therapy case compared to the office-based case.

In the COSTS category, the evaluation of the statement exhibits that online therapy is 30% cheaper than the average office-based therapy in this field.

THERAPY EFFICIENCY is an important category; in both cases neurofeedback therapy was evaluated as an efficient therapy for epileptic patients to reduce the occurrence of epileptic seizures.

In the MOTIVATION category we wanted to determine if our clients and their caregivers could sustain motivation to participate and proceed with the therapy. Negative response (NO) for an office-based therapy case suggested that it is not so easy for our clients to sustain motivation for 60 hours in an office-based therapy setting.

For both cases, commuting because of the therapy was challenging, but the neurofeedback therapy was not. For online therapy, the caregiver has to learn the basics about electrode placement and they also require basic computer skills, which are not necessary for office-based therapy.

Discussion

The results show the benefits of online therapy compared to office-based therapy. Neurofeedback therapy was successful in both cases, but it must be noted that online therapy was more successful since the seizures of our client ceased for 7 weeks. In addition, those two cases that we examined are not identical as every epileptic patient is different and responds as a unicum to the therapy so the results should not be generalized. However, there are several benefits of online therapy that should be specially noted: lower price per one hour therapy, a client saves the time otherwise spent for commuting, the client's and caregiver's motivation is high throughout the process, clients can do more therapies per week and enhance neuroplasticity, which is highly significant for patients with cerebral palsy since their brains have suffered a lot of damage. The downfall of the online therapy is that caregivers must be educated about the basic principles of bio/neurofeedback therapy and electrode placement. It is also advisable that they are used to working with a computer and the Internet.

One of the challenges of online therapy could be that practitioners have to lend their professional biofeedback devices to the caregivers. They should therefore be certain that the caregivers will take good care of the sensitive sensors and devices and that they will be able to recognize the artefacts and do artefact-free EEG reading otherwise the neurofeedback therapy would not be efficient. The AAPB requires that professional devices be sold to non-professionals because this is the only way to maintain the good standards and efficiency of the method.

One of the recent solutions for this problem could be the low cost headset such as Muse and additional professional neurofeedback software Mindlift that could be rented by a therapist. To conclude if this could be a feasible and financially affordable solution for the therapist and clients, more research is needed in the future.

Conclusion

Online neurofeedback therapy has many benefits compared to office-based neurofeedback therapy. Online therapies could be the future of bio/neurofeedback therapies, but in the field of

applied psychophysiology it is crucial that the therapist and the client (caregiver) first establish a therapeutic connection in office-based therapies and then proceed to online therapy. This suggestion could probably be the most successful therapy procedure for the future of online bio/neurofeedback therapies.

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Plenary paper

ENHANCING THE VISIBILITY AND ACCESSIBILITY OF ACADEMIC WORK IN THE DIGITAL ERA

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Abstract

Introduction: *Technology-driven changes alongside a continual increase in online availability and accessibility of journals and papers are rapidly changing the patterns of academic communication and publishing. The dissemination of important research findings through the medical community begins with publication in peer-reviewed journals.*

Aim: *The aim of this article is to identify, critically evaluate and integrate the findings of relevant, high-quality individual studies addressing the trends of enhancing the visibility and accessibility of academic publishing in the digital era.*

Results and discussion: *The number of citations that a paper receives is often used as a measure of its impact and by extension, also of its quality. Many aberrations of citation practices have been reported in an attempt to increase the impact of a paper through manipulation using self-citation, inter-citation and citation cartels.*

Authors' revenues to legally extend the visibility, awareness and accessibility of their research outputs through an increase in the number of citations and amplifying a scientist's measurable personal impact has been greatly enhanced by online communication tools such as networking (LinkedIn, Research Gate, Academia.edu, Google Scholar), sharing (Facebook, Blogs, Twitter, Google Plus) media sharing (Slide Share), data sharing (Dryad Digital Repository, Mandalay data, PubMed, PubChem), code sharing, impact tracking and publishing in open access journals. Many studies and review articles in the last decade have examined whether open access articles receive more citations than equivalent subscription toll access articles. Most of them have come to the conclusion that it is highly likely that open access articles have the open access citation advantage over generally equivalent pay-for-access articles in many, if not most disciplines.

Conclusion: *"Publish or perish", which is a phrase that is usually used to describe the pressure in academia to rapidly and continually publish academic work to sustain or further one's career, can now be reformulated into "Publish and be cited, not to Perish".*

Keywords: *citation, self-citation, citation cartels, open access, accessibility, visibility, new technologies.*

Introduction

Technology-driven changes alongside a continual increase in the online availability and accessibility of journals and papers including their historical archives is rapidly changing the patterns of scholarly/academic communication and publishing. The traditional approach of research dissemination coming to an end once it has been published has changed in the last decade, with an explosive growth of various forms of media used for the dissemination of publications and associated research data, analyses and results, including wikis, blogs and code-sharing platforms (Williams, et al., 2017).

There were about 28,100 active scholarly peer-reviewed English-language journals in 2014, collectively publishing nearly 2.5 million articles in 2013 by a total of 4.16 million original authors. Total authorships were 10 million because each article had an average of 4.2 authors. They are just one part of the total cohort of active researchers whose number varies according to the definition used, but is estimated to be between 6.7 and 8.9 million (Plume, 2014). UNESCO has calculated that only around 1 million of all researchers were original repeat authors, while only 2.5 million authors published at least once over a 5-year period (Mabe, 2002). Tenopir and King reported that although only 10 to 20% of scientists in the United States are employed at universities, they account for about 75% of articles published (King, 2004). A more recent study looked at the most productive authors, defined as those who had published at least once every year over the 16-year period under study (1996–2011). It found 15.2 million publishing scientists of whom just 150,608 (or less than 1%) managed to publish a paper every year. These authors were responsible for 42% of papers and 87% of the very highly cited papers (Ioannidis, et al., 2014).

Although not every download will translate into a full reading, it is estimated that annual downloads of full text articles from publishers' sites are about 2.5 billion with perhaps another 400 million downloads from other sites such as repositories. The key question is who is reading those billions of papers and how big is their visibility and impact. One of the commonly used measures of article impact is citedness or uncitedness. If we consider that an average scientific paper takes authors 90–100 hours to prepare (King, 2004), and two to three reviewers have to then spend an average of 3–6 hours each on peer review (Ware, 2008), then should unread or uncited paper be considered as a waste of human resources, energy and time both for authors, editors and publishers? Are that many publishers needed in the light of the fact that 95% or more publish only one or two journals, while on the other end, the top 100 publish 67% of all journals? Citation of sources not only points the way for other scholars who give credit to others for work they have done, but citations also relate to the way authors perceive the substance of their work and their position in the academic system. Therefore, might manipulation with citation be expected to bring some material and immaterial benefits such as accessibility to research grants, self-promotion and climbing the academic ladder and consequently glorification and admiration among academics? Finally, can citation biases be considered as more serious than other unethical practices (Khaled, 2016) such as ghost and guest authorship or hyper-authorship, plagiarism or research misconducts?

Aim and methods

Uncitedness of worthless papers as well as self-citing, in-group citing and the citing of unread, retracted or never published papers is challenging the academic community. It is under scrutiny due to the impact of new technologies that have enhanced the visibility and accessibility of academic publishing in the digital era.

The aim of this article is to identify, critically evaluate and integrate the findings of relevant, high-quality individual studies, addressing the trends of enhancing the visibility and accessibility of academic publishing in the digital era through literature search, integrated analysis, as well as induction and deduction for synthesis.

Results and discussion

The dissemination of important research findings through the medical community begins with publication in peer-reviewed journals. The process is continued through citation of the original work in subsequent publications and the number of citations received by an article is viewed as a marker of the importance of the original research and is reflected in the impact factor of journals in which the original paper was published. (Kulkarni, et al. 2007).

The number of citations a paper receives is often used as a measure of its impact and by extension, also of its quality. The use of citations as a proxy for impact or quality has been extended from articles to journals with an impact factor. The most-cited paper of all time is the paper by Oliver Lowry describing an assay to measure the concentration of proteins (Lowry, 1951). By 2014, it had accumulated more than 305,000 citations. The 10 most cited papers all had over 40,000 citations. However, at the same time, Thomson Reuter's Web of Science database, with more than 58 million items and only approx. 0.026% had more than 1,000 citations in 2014 (van Noorden, 2014). According to Wabe, the distribution of citations follows the widely found Pareto pattern, with about 80% of citations coming from about 20% of articles. For example, Scopus data for citations to 2008 articles made in 2008–2012 showed almost exactly the same result, while 32% of papers remained uncited (Wabe, 2015; Elsevier, 2013). Although 32% of the papers that remain uncited is a number far from the widely-held belief that most scientific articles are never cited, which had been established in a methodologically flawed piece of work (Hamilton, 1990, 1991) and is periodically non-critically reproduced in ambiguous literature, uncited papers and articles are becoming an important issue in the academic and publishing community.

The share of 50% of articles *"that were never read by anyone other than their authors, referees and journal editors"* (Meho, 2007) is very high regardless of the confusion referring to the precise figures. Furthermore, Meho´s (2007) pointed out the *"sobering fact that some 90% of papers that have been published in academic journals are never cited"*. Even if it is difficult to accept these numbers and connect them to the demonstrated data, non-cited article rate varies considerably by authors and the scientific field; it might be about 82% in humanities, 32% in social sciences, 27% in natural sciences and 12% of all articles in the medical field remain uncited (Lariviere, 2009). But citation counts do not mean that a more cited work is of a higher

quality or accuracy than a less cited work because citations do not measure the quality or accuracy. Citations do not mean that a highly cited author or journal is more commendable than a less cited author or journal (Khaled, 2016).

Many aberrations of citation practices have been reported in an attempt to increase the impact of a paper through manipulating citation, including honorary citations, circumstantial citations, discriminatory citations, selective and arbitrary citations, as well as self-citation, inter-citation and cartel citation. Multiple inherent biases related to the above-mentioned citation practices make citation-based bibliometrics strongly flawed and defective measures (Khaled, 2016).

Whenever citations are used as indicators to evaluate scientific research, self-citations (papers in which the citing and cited paper have at least one author in common) should not only be considered as nothing more than vanity, egotism or an attempt in self-advertising, but also as a tactical tool in the battle for visibility and scientific authority, and should be considered problematic because self-citations do not necessarily reflect the importance of someone's work or its impact on the rest of the scientific community. But the evidence of Fowler's macro study suggested that self-citation does pay off – the more one cites oneself the more one is cited by other scholars and "if each self-citation yields an additional 3.65 citations from others after ten years, then this results in an additional 40% of total citations that may be generated indirectly by self-citations and self-citation, and may therefore account directly or indirectly for more than half of all the citations after 10 years" (Fowler, et al., 2007).

Many other authors have studied self-citation and concluded that self-citations should be removed from citation counts (Glänzel, 2006, Thijs, 2006). The proportion of direct self-citation is relatively constant varying between 10% and 36% with strong variations between specialties (Wallace, et al., 2012).

Aksnes (2003) studied almost 40,000 publications by Norwegian authors and showed that by using a three-year citation window it was found that 36% of all citations represent author self-citations and that the percentage was decreasing when citations were traced for longer periods, with the highest share of self-citation among the least cited papers. There was a strong positive correlation between the number of self-citations and the number of authors of the publications: articles with one author receive 1.15 self-citations on average, but articles with 10 authors receive 6.7. (Aksens, 2003)

In biomedicine, Gami has analyzed articles about diabetes mellitus in clinical journals in 2000 and found that nearly one-fifth of all citations were author self-citations (18%) and concluded that those findings were likely applicable to the general clinical medicine literature and had important implications for the assessment of journal or publication relevance and the process of scientific discovery (Gami, 2004).

Fassoulaki had investigated self-citations in issues of six anesthesia journals and found the range of self-citation rate to be from 11% to 57%. A significant correlation between self-citing rates and impact factors was found ($r = 0.899$, $P = 0.015$) (Fassoulaki, 2000).

According to Kulkarni (2011), approximately 1 in 15 citations of articles in high-profile general medicine journals are author self-citations that peak within around 2 years of publication, which disproportionately affects the impact factor. Studies most vulnerable to this effect are those with more authors, small sample size, and in cardiovascular medicine or infectious disease (Kulkarni, et al., 2011).

Davarpanah found that in general and internal medicine, self-citation accounted for about 16% of all citations, lower than organic chemistry, plant sciences, and electronic engineering (Davarpanah, et al., 2009)

Thomson Reuters currently takes action and sanctions journals (puts them in a 'time out') when they show a strong pattern of self-citation, but the line of acceptable behavior is largely arbitrary. For example, one medical journal was de-listed from Thomson Reuters' Journal Citation Reports after more than 90% of citations involved in calculating their impact factor came from the citations from its own papers (Davis, 2011).

For several decades it has been an undisputed fact that increasingly more scientists tend to cite themselves as a result of egotism, for establishing their own scientific authority or to make their former unwanted works more visible (Lawini, 1982). However, there is unfortunately no significant penalty for the most frequent self-citers, and the effect of self-citation remains positive even for very high rates of self-citation (Nader Ale, et al., 2010).

Honorary citation is also an unfair practice when some authors have a tendency to cite papers written by their colleagues, supervisors or other people they know. Discriminatory citations refer to citing only papers published in journals with a specific high impact factor or when articles written by women are less cited (Khaled, 2016). Reciprocal citation has already been proven through the fact that authors who cite the work of other authors are more likely to find their own work cited in turn (Khaled, 2016).

Inter-citation implies the existence of many patterns and complex connections in citation networks such as reciprocal cross-citing between related journals belonging to the same publisher, or more complex patterns. Citation networks describe relationships between researchers, papers connected with reasonable citation relationships, and are a useful way for analyzing the hidden relationships. Dependence on citation counting as a measure for personal position in the academic society and a prerequisite for many incentives could result in a coercive self-citation where journal editors coerce authors into bolstering their citation counts by requiring that unnecessary journal references be added to a manuscript prior to acceptance. (Franck, 1999; Davis, 2012). Willhite (2012) reported that one in five respondents said that they had been coerced by editors, and while the vast majority of respondents (86%) viewed citation coercion as inappropriate behavior, more than half (57%) indicated that they would consent to the request (Willhite, 2012)

The most dangerous errant behavior is citation cartels, which are described as groups of authors that cite each other disproportionately more than they do other groups of authors that work on the same subject (Fister, et al., 2016). The concept of citation cartels was firstly exposed in 1999 in an essay by Franck who defined this phenomenon as 'groups of editors and journals

working together for mutual benefit'. Franck's definition referred to the editors that used the inter-journal cites to increase the impact factors of their journals as he explained, *"There are ways of accumulating citations that have little to do with scientific value. The simplest way of circumventing the hurdle of productivity enhancement is the formation of citation cartels."* (Franck, 1999).

According to Fister, the citation cartels have also addressed other relationships, like editor to authors or authors to authors and the cartels imply an easy way to obtain scientific excellence by increasing the number of one's own citations. (Fisher, 2016). Cartels work by influencing incoming citations from other journals, so they are difficult to detect. Fister et al. have opted not to show specific results in this early phase of their study and felt the need to be certain before making accusations regarding the involvement in a cartel. Thomas Reuters specifically uses the term *'citation stacking'* as opposed to *'citation cartel',* to avoid making false accusations without the certainty of intent (Enago Academy, 2017).

As an illustration of the citation cartels Davis (2012) described atypical citation patterns between four biomedical journals as the first case of a citation cartel, and later in 2016 a cartel between two biomedical journals damasking the role of Applied Clinical Informatics in distorting the citation performance of Methods of Information in Medicine through being involved in two retrospective, prolective observational studies on recent publications from both journals (Davis, 2016). A classic example was a review article (Eve, 2010) that was published in *Medical Science Monitor* citing 490 articles, 445 of which were to papers published in *Cell Transplantation*. All 445 citations pointed to papers published in 2008 or 2009. Of the remaining 45 citations, 44 cited the *Medical Science Monitor*, again, to papers published in 2008 and 2009 and of the four authors of that review, three were members of the editorial board of *Cell Transplantation*, which had seen phenomenal growth of its impact factor between 2006 and 2010; in 2006 it was 3,482 while in 2010 it had almost doubled to 6,204. (Davis, et al., 2012). In the same year of 2010, two of these editors also published a review article (Park, 2010) in *The Scientific World Journal* citing 124 papers, 96 of which were published in *Cell Transplantation* in 2008 and 2009. Of the 28 remaining citations, 26 were to papers published in *The Scientific World Journal* in 2008 and 2009 (Davis, et al., 2012). Similar cartel citations had been discovered through proliferation of papers by Serbian authors in two Bosnian WoS indexed journals (Šipka, 2012), two European journals in the field of soil science (Kleis, 2017) and in four Brazilian journals that had published seven review papers with hundreds of references to previous research (2009–10) in each other's journals, which raised their 2011 impact factors.

Despite the fact that a small percentage of journals and authors have been discovered to take part in citation cartels, this practice damages the validity of the impact factor and the reputation of scientific literature. This behavior is also referred to as the 'impact factor mania' and it persists because it confers significant benefits to individual scientists and journals. According to the Cassadeval impact, factor mania "is a variation of the economic theory known as the "tragedy of the commons," in which scientists act rationally in their own self-interests despite the detrimental consequences of their actions on the overall scientific enterprise" (Cassadeval, et al., 2014)

The science world is plagued by citation cartels, but however large the cartel phenomenon, it is only one of the several illnesses afflicting modern science, which tends to reward quantity of metrics — more citations, more papers, more grant money — over quality (Oransky, 2017).

The symptoms of that contagious plague could be also visible through 'citation inflation' – an increase in the average citations per article. The number of citations is increasing faster than publications. Ware has compared the five-year periods 1999/2003 and 2004/2008 and found that the number of publications increased by 33%, while citations increased by 55%. In addition, the trend in average citations per article for the period 1992–2012 for all countries has risen from about 1.7 in 1992 to 2.5 in 2012. (Ware, 2015).

Authors' revenues to legally extend the visibility, awareness and accessibility of their research outputs with rises in citation and amplifying the scientists' measurable personal impact has greatly been enhanced by on line communication tools like networking (LinkedIn, Research Gate, Academia.edu, Google Scholar), sharing (Facebook, Blogs, Twitter, Google Plus) media sharing (Slide Share), data sharing (Dryad Digital Repository, Mandalay dana, PubMed, PubChem), code sharing, impact tracking and similar tools.

Open access publishing has opened a new era in research work visibility and has important implications for the academia, university librarians, and even more so for the scientific, technical and medical publishing industry. By 2014 more than 50% of the papers published in peer-reviewed journals could have been downloaded for free via Open access in two most important forms: through publication in an OA journal (Gold OA) or through deposition in an OA repository or self-archived on a personal or departmental web page (Green OA).

The entire OA publication model continues to expand rapidly with an increase of available papers by 9.4% per year. According to the study conducted by Archambault in 2014: "The fields with the greatest proportion of OA were general science and technology (Adjusted OA=90%), biomedical research (71%), mathematics and statistics (68%), and biology (66%). OA was not as commonly used in visual and performance arts (Adjusted OA=25%), communication and textual studies (31%), historical studies (34%), engineering (35%), and philosophy and theology (35%). Green OA was particularly present in physics and astronomy (25.6%), mathematics and statistics (24.3%), and economics and business (11.3%). Gold OA availability was greatest in general science and technology (58%) and lowest in general arts, humanities, social sciences (2.6%), and visual and performing arts (2.8%), built environment and design (3.5%) and engineering (4.1%). Other fields with high availability in Gold journals included biology (17%), agriculture, fisheries and forestry (16%), and public health and health services (16%). Other forms of OA were frequently encountered in biomedical research (48%), psychology and cognitive sciences (43%), biology (42%), earth and environmental sciences (38%), and clinical medicine (35%). It should be emphasized that according to the Archambauld's study, out of the 4.6 million scientific papers from peer-reviewed journals indexed in Scopus during the 2011–2013 period in biomedicine, 2.5 million were available for free in 2014. A very large number of papers were freely available in clinical medicine (680,000 papers), biomedical research, physics, and astronomy (close to 250,000 papers) (Archambauld, et al., 2014).

Many studies and review articles in the last decade have examined whether open access (OA) articles receive more citations than equivalent subscription toll access (TA) articles. The majority have come to a conclusion that OA articles might have open access citation advantage (OACA) over generally equivalent pay-for-access articles in many, if not most disciplines.

The first study published about open access citation advantage analyzed 119,924 computer science articles and found a 157% increase (2.5 times more likely) in the mean number of citations of OA articles over non-OA and concluded that free online availability substantially increases a paper's impact (Lawrence, 2001).

Five years later, Eysenbach found that open access articles were twice as likely to be cited and were more heavily cited than non-OA articles (Eysenbach, et al., 2006).

According to Archambauld, who analyzed 1 million peer-reviewed journal articles indexed in Scopus from 1996-2013, OA papers are between 26% and 64% more frequently cited on average for any given year than all the papers combined, whereas non-OA received between 17% and 33% fewer citations. Furthermore, on average, Green OA papers have the greatest citation advantage with being cited 53% more frequently than all papers, followed by Other OA, 47% more frequently, followed by Gold OA, which has a citation disadvantage of 35% on average, compared to a disadvantage of 27% for non-OA papers (Archambauld, et al., 2014).

In 2011, a sample of 12,354 original research articles which were published in 93 Oxford Open journals in 2009 have shown that medicine, math/physical sciences, and life sciences all showed an OACA ranging from 52% to 83% (Xu, et al., 2011).

According to Antelman Web of Science, citation rates are enhanced for OA articles over non-OA articles by 91% for mathematics, 51% for electrical and electronic engineering, 86% for political science) and 45% for philosophy (Antelman, et al., 2004).

Hajjem claimed that open access articles had a citation impact advantage varying from 25% to over 250% in 4 disciplines and 28 sub-specialties (Hajjem, et al., 2005).

Broady justifies consistent citation advantage of OA articles over Non-OA articles published in the same journal and year ranging from 80% to 200% across 12 years of published articles in physics and mathematics. (Broady et al. 2004). In addition, the same author found that articles self-archived by authors receive between 50-250% more citations (Broady, et al., 2007).

Greyson analyzed 1,923 articles from four health care journals and concluded that OA archived articles were 60% more likely to be cited at least once and, once cited, were cited 29% more than non-OA articles (Greyson, et al., 2009).

The Journal of Postgraduate Medicine showed a remarkable 365% increase in citations per article after switching to open access (Sahu, et al., 2005).

A study of 11 biological and medical journals that contain both open access and subscription access articles indicates a citation advantage for open access articles of 17% (Davis, 2009).

Zhang compared web citations from peer-reviewed articles and informal web sources to an open access communications journal and a subscription communications journal. The OA articles received twice as many web citations than the subscription articles. Moreover, they also received a greater percentage of web citations from developing countries.

An explanation may lie in the fact that open access articles are downloaded far more than toll access articles, and download advantage is easily 100% over toll access articles. More downloads might lead to more citations (Wagner, et al., 2010). What needs to be discussed is authors making a self-selection of higher quality articles for OA, which leads to Quality or Selection bias, as well as how significant is the influence of earlier dissemination via preprints/OA repositories, which leads to early access bias (Wagner, et al., 2010). These studies have shown that the citation advantage for OA self-archiving is independent from the journal impact factor, article age, and number of co-authors (Harnad, et al., 2007).

It has been proven that multiple open access availability has a positive impact on its citation count with the possibility that for every unit increase in the availability of OA articles, citation numbers increase by 2.348 (Xia, et al., 2011).

Furthermore, OA articles are downloaded and read three times as much as non-OA articles, and there is a positive correlation between early download counts and later citation counts (Harnad, et al., 2006).

Wang founded that average article page views were 2.5 to 4.4 times higher for OA articles and the OA page views were much more sustained and steady over a much longer period than non-OA articles (Wang, et al., 2015).

There are also a few studies that found no significant effect of open access. Authors believe that the self-selection of higher quality articles into open access explains at least one part of the observed open access citation advantage (Davis, et al., 2010, 2011).

Finally, even if the OACA is minimal or non-existent, the citation advantage there is in the number of other reasons to publish OA including benefiting teachers, students, practitioners, the general public, and researchers in less developed countries or working for small organizations by removing access barriers while maintaining more control and free use of one's own work (Wagner, et al., 2015).

In addition to the citation data, open access publishing has influenced a new era in research work visibility and has had important implications for the academia, university librarians, and even more so for the scientific and medical publishing industry. Consequently, discoverability and visibility have been enhanced through new networks such as social networks and platforms and over 400 tools and innovations in scholarly communications. All of these will enhance the possibility to be cited in a much fairer way.

Categories of new tools could be divided into several categories even though they overlap in many layers: networking (LinkedIn, ResearchGate, Academia), idea sharing (blogs, WhatsUp, Twitter/Google Plus), media sharing (SlideShare, Youtube, Vimeo, Weibo), data sharing

(Dryad Digital Repository, figshare and Mendeley data, preprint servers (arXiv, bioRxiv, ChemRXiv), code sharing (GitHub , SourceForge), publication and citation tracking (ORCID, Google Scholar, and Microsoft Academic Search), organizational impact (Kudos; Altmetrics; ORCID), alternative impact tracking (ImpactStory, Altmetric, PlumX, ResearchGate score) and research amplification (Kudos) (Williams, 2017).

Examples of the increasing importance of these non-traditional sources of scientific information, according to Williams (2017), is the increasing prevalence of links to Wikipedia, blog posts and code-sharing in reference lists associated with references in scientific publications (~35,000 citations to Wikipedia, ~11,000 for YouTube, ~10,500 for Facebook, and ~7000 for Twitter) (Williams, 2017). Especially tweets have the potential to develop and serve as a tool for scientific idea dissemination, bearing in mind that every second on average, around 6,000 tweets are tweeted on Twitter, which corresponds to over 350,000 tweets sent per minute, 500 million tweets per day and around 200 billion tweets per year with the volume of tweets growing at around 30% per year, as well as WhatsApp with 1.3 billion monthly active users and constantly growing.

Despite the prevalence of new social media, networking, data sharing, tracking and amplification as research activity distribution tools, the vast majority of scientists do not use these tools to enhance sharing, evidencing and amplifying their scientific research (Collins, et al., 2016) even if that could help some researchers to promote their work even after they had already published in a OA source.

Eysenbach (2011) had analyzed the metrics of the social impact based on Twitter and the correlation with traditional metrics of the scientific impact and found that highly tweeted articles were 11 times more likely to be highly cited. Tweets also showed moderate correlation strength with Google Scholar, but not with Scopus because Google Scholar indexes many non-article sources (Eysenbach, et al., 2011), although there might be some methodological and interpretive problems (Davis, 2012b).

Many publishers and digital libraries nowadays provide article-level usage data to the public, as well as article views data on a daily level with the so-called ‘dynamic usage data’ that allows tracing of realtime research trends, even to predict the number of downloads and citations (Wang, et al., 2014). Altmetrics data are extremely useful to track the influence of an institutions’ work on public policy and helps provide an insight into the value of research outputs. It has been proven that open access gives an advantage considering citation (open access leads to obvious citation advantage), article usage (for article downloads, non-OA papers only have a short period of attention, while the advantage of OA papers exists for a much longer time) and social media attention (a slightly higher Twitter and Facebook activity for OA articles) (Wang, et al., 2015).

Several papers have compared the number of citations in the Web of Science to either Scopus, and/or Google scholar, Google, ResearchGate or Academia.edu. Niyazov found that for all types of publication the median number of citation is the highest in Google Scholar, which is greater than the median number found in the Web of Science, while a paper in a median impact

factor journal uploaded to Academia.edu receives 16% more citations after one year than a similar article not available online, 51% more citations after three years, and 69% after five years (Niyazov, et al., 2016).

Compared to Academia.edu, ResearchGate is a multidisciplinary academic social website that aims at helping academics to connect with each other and publicize their work. ResearchGate has indexed impressively many citations for a single website and has become a major source of academic papers, but still found less citations than Google Scholar but more than both the Web of Science and Scopus. ResearchGate has also launched its own citation index by extracting citations from documents uploaded to the site and reporting citation counts on article profile pages. Since authors may upload preprints to ResearchGate, it may use these to provide early impact evidence for new papers (Thelwall, 2017). But it also has to be considered that about half (51%) of the 78% user-uploaded articles that are not open access violate publisher copyright agreements (Jamali, 2017).

Vaughn has compared the citation of 1,483 publications in Web of Science (WoS), Google, and Google Scholar. Google Scholar citations had a stronger correlation with WoS citations than Google citations. With 92% of Google Scholar citations representing an intellectual impact, it has a considerable potential to become the primary source for measuring research impact (Vaughn, 2007).

It has also been investigated that Wikipedia citations are important evidence of the impact of scholarly articles and books. The results show that citations from Wikipedia to articles are too rare for most research evaluation purposes, with only 5% of articles being cited in all fields. (Thelwall, 2017).

According to Williams (2017) investing additional efforts into sharing data, research outputs or the final published products of the research work may directly benefit a scientist's career leading to new collaborations, new funding or even facilitate new discoveries (Williams, 2017).

Conclusion

"Publish or perish" is a phrase usually used to describe the pressure in the academia to rapidly and continually publish academic work to sustain or further one's career (Garfield,1996), but it could now be reformulated into "Publish and be cited, not to perish" even though multiple inherent biases related to different citation practices like self-citations, circumstantial citations, as well as negative citations, wrong citations, multi-authorship-biased citations, honorary citations, discriminatory citations, selective and arbitrary citations, and similar, make citation-based bibliometrics strongly flawed and defective measures (Khaled, 2016).

By using self-citation scientists tend to cite themselves for many reasons; not only to make their past works visible, but also to feed their egotism, as well as to establish and upgrade their own scientific authority. However, these attempts and the hidden motivation are relatively easy to discover, if needed. On the other hand, circular citation, inner citation and citation cartels used as a tactical fraud in the struggle for visibility and undeserved scientific authority and promotion are not only morally problematic but illegitimate, even though there is no significant

penalty for the most frequent self-citers or circle and cartel members. Therefore, the effects caused by self-citations and other pernicious academic behavior should be carefully considered. Using citations as an indicator of scientific impact is already distorted and using the quantity of cites as a proxy for quality or visibility is flawed. Open access publishing has begun a new era in research work visibility and has had important implications for the academia, university librarians, and even more so for the scientific and medical publishing industry. Consequently, discoverability and visibility is strongly enhanced through new networks such as social networks and new platforms that will enhance the possibility to be cited in a much fairer way. Despite the prevalence of new social media, data sharing and research activity distribution tools, the vast majority of scientists do not use these tools enough to enhance sharing, evidencing and amplifying their scientific research even if it is presently unquestionable that the sharing, networking and outreach of research work could bring mutual benefits to a scientist's career and humanity in general through new collaborations, new funding and new discoveries.

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APPROACHES TO MODERN IMPLEMENTATION OF DENTAL RESTORATIONS USING DIGITAL TECHNOLOGIES AND THE IMPORTANCE OF THE NECESSARY COMPETENCIES OF MANUFACTURERS

PRISTOPI PRI SODOBNI IZVEDBI ZOBNIH RESTAVRACIJ Z UPORABO DIGITALNIH TEHNOLOGIJ IN POMEN POTREBNIH KOMPETENC IZVAJALCEV

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Abstract

Introduction: *We are living in a world where modern technologies help us overcome various obstacles in our daily lives. The rapid progress of digitalization and computing is reflected in the development of technological procedures in the fields of dental medicine and laboratory dental prosthetics. In dental prosthetics, computers are used in clinical and laboratory work where they are successfully replacing conventional methods of dental implant implementation. The data show that these technological advancements are beneficial for patients, they enable quality prosthetic treatment and make the procedures in the oral cavity easier. Modern technologies impact the clinical and laboratory procedures of dental implant implementation and offer new options for prosthetic treatment.*

Methods: *A descriptive (non-experimental) method of empirical research was used in the study. A survey was conducted among Slovenian dental laboratories in 2016 and among Slovenian dentists, who use digital technologies, in 2017. The data were processed using the methods of descriptive statistics and the SPSS software.*

Results: *The results indicate that the use of digital technologies in dentistry is beneficial for workers in dental practices and in dental laboratories. Collected and analysed data show that dental laboratories are successful in adopting new technologies. Despite considerable costs associated with adopting new technologies, at least one of them is already used in 53% of the Slovenian dental laboratories.*

Discussion: *Although the use of modern technologies offers several advantages for everyone working in dentistry, there are also some disadvantages that have to be considered and dealt with. It has to be emphasized that modern technologies positively affect patient well-being, which is of central importance to healthcare providers. A shorter execution time for implementation of certain dental implants means that patients can get provisional or fixed dental implants on the day of the procedure. More and more dental restorations of partial or complete toothlessness are performed using dental implants and digitally planned and produced suprastructures. Digital competence and digital literacy are becoming increasingly important for working in and developing the field. Educational processes try to follow the*

development of technology, but the process of dental digitalization should be reversed. It should first be researched and then implemented into general use through education.

Key words: *dental prosthetics, digital technologies, competencies, research*

Izvleček

Uvod: *Danes živimo v sodobnem svetu, ko nam sodobne tehnologije lajšajo premagovati življenjski vsakdan. Hitremu razvoju digitalizacije in računalniških tehnologij sledijo tudi tehnološki postopki v dentalni medicini in laboratorijski zobni protetiki. V zobni protetiki se uporabljajo računalniške tehnologije, tako pri kliničnem, kakor tudi laboratorijskem delu, ki več kot uspešno nadomeščajo utečene konvencionalne metode izvedbe zobnih nadomestkov. Vzpodbudni so podatki, ki govorijo o prednostih za paciente, o možnostih kvalitetne sodobne protetične oskrbe ob bolj prijaznih pripravljalnih in izvedbenih postopkih v ustni votlini. Sodobne tehnologije ne prinašajo samo sprememb pri kliničnih in laboratorijskih postopkih izvedbe zobnih nadomestkov, prinaša tudi nove možnosti zobnoprotetične oskrbe.*

Metode: *Deskriptivna neeksperimentalna metoda empiričnega raziskovanja je bila izvedena s pomočjo anketnega vprašalnika med zobnimi laboratoriji v Sloveniji v letu 2016 in anketnega vprašalnika izvedenega med zobozdravniki, uporabniki digitalnih tehnologij v Sloveniji v letu 2017. Za obdelavo podatkov smo uporabili metode opisne statistike.*

Rezultati: *Rezultati kažejo, da je uporaba digitalnih tehnologij v zobozdravstvu prinesla pomembne prednosti za izvajalce v zobnih ordinacijah in izvajalce v zobnih laboratorijih. Zbrani in analizirani podatki kažejo tudi uspešno prilagajanje zobnih laboratorijev novim tehnologijam. Kljub temu, da so sodobne tehnologije velik finančni zalogaj za zobni laboratorij, se vsaj ena od sodobnih tehnologij že izvaja v 53 odstotkih v slovenskih zobnih laboratorijih.*

Razprava: *Sodobne tehnologije ne prinašajo samo prednosti za celoten izvajalski tim v zobozdravstvu, povezane so tudi s kakšnimi težavami, ki jih bo potrebno ovrednotiti in najti določene rešitve. Vsekakor pa je pomembno poudariti, da sodobne tehnologije prinašajo tudi veliko prednosti za paciente, kar pa mora biti zmeraj osnovno vodilo v zdravstveni dejavnosti, kamor sodi tudi zobozdravstvo. Skrajšali so se časi izvedbe za določene vrste zobnih nadomestkov, kar je prednost za paciente, saj so lahko še isti dan po posegu oskrbljeni z začasnim ali trajnim zobnim nadomestkom. Vse več je sodobnih restavracij pri delni ali totalni brezzobosti z vstavitvijo zobnih vsadkov in digitalno načrtovanih ter izvedenih suprastruktur. Vse pomembnejše postajajo »moderne digitalne« kompetence ali poglobljena strokovna digitalna pismenost, ki je pogoj za delo in razvoj te stroke. Izobraževalni procesi spremljajo razvoj tehnologij, vendar bi bilo bolje, če bi razvoj digitalizacije zobozdravstva šel po poti od raziskovanja preko procesa izobraževanja z implementacijo v širšo prakso in ne obratno, kot se v določeni meri trenutno dogaja.*

Ključne besede: *zobna protetika, digitalne tehnologije, kompetence, raziskava*

Introduction

We live in a modern world dominated by digital technologies and digital media. We often ask ourselves who leads our life style and pace, and how technology influences our lives. However, we must acknowledge that new technologies ease our everyday life. The rapid progress of digitalization and computing is reflected in the development of technological procedures in the fields of dental medicine and laboratory dental prosthetics. Therefore, also in the fixed prosthetics, the method of computer-aided design/computer aided manufacturing – CAD/CAM (Bilgin, 2016; Van Noort, 2012) was introduced and in dental prosthetics computer technologies are used in clinical as well as laboratory work. Computer-aided design (CAD) and computer-aided manufacturing (CAM) of prosthetic restorations, orthodontic appliances, various models and accessories for surgical procedures, analyses and design in virtual articulators, the digital X-ray imaging and three-dimensional (3D) printing are used (Singh and Mohan, 2014; Prebil, 2017). CAD methods have been established as partly digital methods that include classical imprinting with imprinting masses and extra-oral reader or scanner in the laboratory for scanning plaster model or imprint, and completely digital methods. These include inter-oral scanning with inter-oral reader, which reduces clinical laboratory procedures. Classical imprinting and preparation of working model are not necessary for certain restorations (Van Noort, 2012). Dental implants have become an increasingly used treatment procedure and are progressively used for replacement of the lost teeth, and can be related to the development of digital technologies. The development of new forms, sizes, and various surfaces of dental implants allows new possibilities for partially or completely toothless patients. This includes also the patients with strong resorption of alveolar bone in whom the use of dental implants has so far not been possible, either due to difficult insertion or difficult access (Widmann and Bale, 2006). Today, technology enables us to completely define the patient's surgical, clinical, and prosthetic treatment process. However, we should adhere to the basic guidelines in the use of the latest technology (Poltras and Pena, 2016). In the last decade, the techniques of dental implants insertion have been developed mainly due to the development of three-dimensional (3D) imaging (X-ray CT imaging) and computer technology of the same name (Jung, et al., 2009; Schneider, et al., 2009; D'haese, et al., 2012). In practice, computer-controlled surgical procedures in oral cavity are already performed, and the technology enables the reversed planning from prosthetic product towards the beginning of the procedures – surgery. Virtual dental substitutes enable planning and choice of dental implants in regards to the appearance and function of the final prosthetic substitute (Ganz and Scott, 2013, Orentlicher and Abbond, 2011). Recording of the situation in the mouth can be performed classically, that is, manually with imprints, or using digital technologies and inter-oral reader or scanner. Such data capturing facilitates manufacturing by omitting classical procedures, such as imprinting, which is less pleasant for the patient, and the construction of plaster models (Prebil, 2017). Computer technology uses DICOM format to convert data into CAD/CAM technology for production of surgical guides for implementation of guided insertion of dental implants (Gali and Sirsi, 2015). Schneider and colleagues (2009) in their survey report 9% survival of dental implants after one year of clinical observation and 4.6% of post-operative complications. In such a planning, we avoid complications in implementation of clinical procedures that are, in the case of implant treatment, a guarantee for good prosthetic treatment and patient satisfaction

(Jansen, 2014, Simon, 2015). By performing inter-oral data capturing or scanning, we obtain virtual model in a short time as well as in natural colour. Time of imprinting is significantly reduced, and in a case of potential error, a fast bigger or smaller correction is possible, while no new imprinting is needed (Mehl, et al., 2013). Virtual models are transferred into computer or sent via the Internet connection to the laboratory, where a frame or a final restoration is designed or modeled in the CAD software, and manufactured in the CAM software (Luthardt, 2001). CAM methods are divided into subtraction methods or material removal methods or milling from a larger block of material, and adding methods of adding material in layers or adding technologies (Bilgin, 2016; Van Noort, 2012). Computer aided manufacture of ceramic restoration CAM is performed in a milling unit. After the milling is finished, the ceramic object is further processed manually, and adapted to the working model. Processing of external surface structures and functional occlusion morphology is followed by glazing and object individualization with the corresponding intensive ceramic colours (Zagoričnik and Kopač, 2017). From the perspective of rational use of material, the previously mentioned adding technologies are very interesting and promising because they use artificial masses in a form of photo-polymer resins and thermoplasts in manufacturing, as well as various alloys and even ceramics. Adding technologies are divided into several sub-technologies, such as procedures of selective coagulation and melting, and technology of multi-nozzle spraying with 3D printers – stereolithography (Gali and Sirsi, 2015, Drstvenšek, 2017). Charles W. Hull was the one who introduced the term "stereolithography" and defined it as a method of manufacturing solid objects in printing on the previous layer that is simultaneously coagulated under strong ultraviolet light. The manufacturing procedure of such 3D object using stereolithography is implemented in several stages (Van Noort, 2012). Stereolithography is a recent method in dental prosthetics (especially in Slovenia) that enables manufacturing of dental substitutes and other accessories using 3D-planning and implementation. The procedure of stereolithography is performed by a device containing liquid photopolymer material. In this process, the product is polymerized at the time of application in the machine only in 80%, and in the remaining 20% to the final polymerization is implemented under a strong ultraviolet light in a dedicated device (Lal, et al., 2006). By using modern technologies and CAD/CAM systems, prosthetic treatment is becoming increasingly faster, more precise and more comfortable for the patient, especially in terms of extensive prosthetic rehabilitations. In patient's care, treatment time is reduced as well as stress ratio experienced by the patient in the rehabilitation process (Krekmanov, et al., 2000; Becker, et al., 2005; Aparicio, et al., 2001; Malo, et al., 2003; Misch, et al., 2003).

Methods

For the purpose of this study, various research methods were used. After the review of the literature on digital technologies and their use in planning and implementation of clinical procedures in the patient's mouth, and implementation of dental restorations in a dental laboratory, quantitative research methods were used. The survey included the entire population of dentists, since in Slovenia. According to the equipment sellers' and field sales specialists' reports, there are 25 dental clinics equipped with inter-oral readers. The main research instrument used was a questionnaire (Q). A total of 23 dentists responded to the survey. The data were processed using SPSS statistical software. The basic research question was how digital technologies used in the patient's mouth affect working procedures in the mouth and

the quality of the entire treatment. The study focused on the benefits of new technology for the patients and technology users in dental clinic – dentists, and the importance and influence of digital technologies in manufacturing dental substitutes in a dental laboratory. The target population of the study were all the dentists in Slovenia using inter-oral reader or scanner. In a specific segment, the results of the current study were compared to the findings of the study conducted in 2016 (Rojko, 2016), which analysed Slovenian dental laboratories in regards to manufacturing technologies and products manufactured using various technologies.

Results

The aim of the study was to obtain information on the use of inter-oral readers – scanners (IOS) that are the most advanced digital achievement in clinical procedures for implementation of dental restorations in a dental clinic. The focus was on information on employment of users of inter-oral scanners (IOS), the reasons for the purchase, the purpose of the products used, the quality of products, the advantages or disadvantage of this technology for patients, and the users' cooperation with dental laboratory. The survey also sought information on the number of dental clinics which manufacture dental substitutes using their own milling units, thus reducing orders for dental laboratory.

The survey included the entire population of users, that is, 25 dental clinics in Slovenia, equipped with inter-oral readers.

The survey is relevant since it included 92% of the entire population of IOS users in Slovenia, The total of 23 dentists participated in the study, of whom16 (70%) were male and 7 (30%) were female. Over half of the participants (52%; 12) have private practices – concessionaires, 39% are self-funding, and 9% (2) are employed in a public institution. Two respondents have IOS in their office, but do not use it. Table 1 and Table 2 presents the processed data of 21 users, i.e. those who perform their services using digital technologies in the mouth.

The answers to the third question enquiring about purchase decision revealed that 19% (4) of the respondents decided to purchase IOS as a response to challenge of new working methods (1), independence (1), easier cooperation with laboratory (1), and digital communication with laboratory (1). In answers to the fourth question on the purpose and use of IOS, 14% of the respondents added other possibilities of use, such as archiving, planning, posts and core systems (1), implants, scales, orthodontics (1), and research work (1). In the seventh question on advantages for a patient, the respondents enlarged the list of given options with the possibility of corrections (1) that are provided by the introduction of digital impressions, the patient's ability to see their "scanned" digital impression (1), and lower price for the patient (1). The answers to the eighth question on advantages for dental clinic (Table 1), yielded information that 76% of the respondents use their own milling unit. This information is worrisome for the owners of dental laboratories as regards the quality of these products. One of the respondents opined that it is possible to obtain good quality products only in dental laboratory and not in a dental clinic. Over half of the respondents (52%; 11) stated that the advantage of IOS is fast data delivery into the laboratory (Table 1). Advantages for the patients are important and there are more than just a few, one of the most important being the fact that

patients no longer have to tolerate their mouths being full of imprinting material because classical imprinting is no longer necessary.

Table 1. Opinion on IO scanner

		n	%
Reason for scanner purchase	Patient's comfort	17	81
	Higher precision	15	71
	Economic reasons	9	43
	Other	4	19
Purpose of using IO scanner	Solo coatings	21	100
	Inlays	20	95
	Onlays	20	95
	Smaller dental bridges	17	81
	Bigger restorations	10	48
	Other	3	14
Precision of products	Same precision	3	14
	Higher precision	2	10
	Significantly higher precision	16	76
Advantages for a patient	Patient's comfort	21	100
	Shorter time of data capturing	14	67
	More precise products than in classical imprinting	13	62
	Other	3	14
Advantages for dental clinic	Own milling unit	16	76
	Fast delivery of the data into laboratory	11	52
	Easier work compared to classical imprinting	11	52
Disadvantages for a patient	None	10	48
	Small constructions	5	25
	Higher price	5	24

The data from the ninth question on cooperation with laboratory are interesting: 62% of the respondents believe that a laboratory they cooperate with has a modern equipment, and only 38% send products to another laboratory or abroad (2). According to these data, Slovenian laboratories avail of the state-of-the-art equipment and perform CAD/CAM technology – milling in 62% of the cases, followed by 3D printing technology and adding technology (14%), and selective laser application (10%).

Table 2. Cooperation with laboratory and laboratory technologies

		n	%
Cooperation with laboratory	Cooperation with laboratory	13	62
	Sending into another laboratory	4	20
	Sending abroad	2	10
Digital laboratory technologies	CAD/CAM technology – milling	13	62
	3D printing of supporting frames	3	14
	Selective laser applying of carrier structures	2	10

The study findings were compared to the results of a similar survey conducted in 2015, which included 130 dental laboratories (Rojko, 2016). It was established that in manufacturing products these laboratories mostly used the CAD/CAM milling technology, and the selective laser 3D technology for applying metal frames was used in 14 dental laboratories by ordering carrier frames in milling or laser (SLT) centre (Table 3). These are high-priced demanding technologies of manufacturing carrier metal frames.

At that time the technology of 3D printing of carrier frames did not exist in Slovenia, and digital imprints were accepted only in two dental laboratories.

The data obtained confirm positive trends in the introduction and use of modern digital technologies in dental clinics and dental laboratories. The benefits of digitalization are friendlier procedures in mouth for the patients and modern and quality dental substitutes. The advantages for the patients include also better prosthetic treatment and consequently better quality of life.

Table 3: Modern technologies used in dental laboratories

			Product type			
			Zirconium frames	Metal frames	Model manufacturing	Digital impression
Technology	CAD/ CAM	No. of laboratories	24	10	3	2
		Share of laboratories using this technol. among lab. that man. this product	100%	53%	100%	100%
	Laser 3D (SLT)	No. of laboratories	1	14	0	0
		Share of laboratories using this technol. among lab. that man. this product	4%	74%	0%	0%

Discussion

Digital technologies were first used in dental laboratory for manufacturing dental substitutes and restorations, while their use in implementation of clinical procedures in dental clinic has only recently been introduced. In the last decade digital technologies significantly contributed to the development of implant-prosthetic treatment, mainly due to the development of three-dimensional (3D) imaging (X-ray CT imaging) and computer technology of the same name (Jung, et al., 2009; Schneider, et al., 2009; D'haese, et al., 2012). It should be emphasised, however, that the human work is still the key factor in rehabilitation success regardless of precision and efficiency of modern computer systems (Poltras and Pena, 2016). By using digital technologies, the competence frame of dentistry team changed significantly from the patient's first contact with dental clinic to the final implementation of prosthetic treatment. Within this process, the role of the laboratory dental prosthetic technician is significant. It requires education for sustainable development, which, however, poses a huge financial burden for dental laboratories. Education in this field has greatly improved in recent years. It is necessary to follow the latest trends and tailor the academic content and learning. It necessitates modern education equipment so that young professionals can develop the required competences already during their formal studies. The labour market demands the personnel with appropriate competences also in the field of modern technologies. The organizational atmosphere and organizational culture among dental practitioners are also changing, mainly as a result of

accelerated privatization in dentistry. The new wave of change is dictated by novel approaches and digital technologies. Digital competences and digital literacy in dental practice and field development are becoming increasingly important. In addition to competences, human capital embraces also intellectual skills and relationships. Here, the knowledge refers to formally obtained knowledge that cannot be acquired by experience, but only through formal education grounded on solid and profound theoretical base. Other components, skills, and experience can be learnt and obtained through training (Merkač Skok, 2005).

After reviewing the literature, we can conclude that digital technologies are paving their way into the dental clinics also in Slovenia as the inter-oral readers or scanners are regularly used in 21 dental clinics. The analysis of the questionnaires shows that only 9% of IOS devices are used in public dentistry, and that 91% of the devices are owned by private undertakings with concession (52%), and self-funding subjects (39%). This finding leads to a presumption that private undertakings take better care of their work development and technological progress than the clinic, and therefore provide better treatment of their patients. This can be confirmed by the fact that 81% of the dentists bought IOS to provide better comfort to the patients, and 71% specified precision as the second reason. As many as 76% of them claim that prosthetic products are more precise. The most important reason cited is the patient's comfort (100%). It is anticipated that in the coming years we will face faster trend of modernization of dental clinics with IOS devices, as, according to 48% of the respondents, these devices do not bring any disadvantages for the patients. Only 24% of the respondents believe that currently the costs of these devices are too high, but the prices are expected to fall. The survey revealed that digital imprints can be used in all fixed prosthetic restorations. The survey questions did not address the use of digital imprints in the field of removable prosthetics and other branches of dentistry, because they are still in the early stages of development. It is interesting to note that 76% of the dentists manufacture the above-mentioned products by themselves in dental clinics using their own milling unit. We lack the information on the quality of these products; however, one of the respondents argued that it is possible to produce good quality products only in a dental laboratory, and not in a dental clinic. Current developmental trend is directed towards manufacturing simple dental substitutes in a dental clinic, and top-quality demanding substitutes manufactured in completely digitally-equipped laboratories by highly qualified and competent laboratory dental prosthetic technicians. Positive effects of digitalization for patients are friendlier procedures in the mouth as well as modern and quality dental replacements that ensure better prosthetic treatment for patients and consequently better quality of life.

Conclusion

The use of digital technology currently regulates and creates working processes almost in every healthcare activity, including electronic making of an appointment, regulation of waiting lists, recording of the performed services, accounting and other. The article aimed to present the use of digital technologies in the performance of clinical procedures in dentistry, and to highlight the advantages of modern technologies in laboratory procedures of manufacturing dental substitutes and other accessories. The benefits are expanding to the implant-prosthetic treatment, and laboratory manufacturing of dental and other substitutes. Digital imprinting enables more comfortable and better quality clinical procedures for the patients. The

introduction of digital technologies opens also other perspectives in the field of dentistry that will have to be observed in the future, especially in education of competent users of modern technologies and top manufacturers of products and service performers in dentistry. This presents a challenge for the state institutions responsible for healthcare system, entailing new approaches in the dental care of consumers.

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Plenary paper

ACCEPTANCE OF HOME TELEMEDICINE SERVICE IN CHRONIC CONDITIONS – THE PATIENTS' PERSPECTIVE

SPREJEMANJE STORITVE TELEMEDICINSKE PODPORE KRONIČNEMU BOLNIKU NA DOMU – VIDIK BOLNIKA

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Abstract

Introduction: *Telemedicine (TM) services for chronic patients are becoming an increasingly important part of support for patients in the self-management of their chronic conditions in their home environment. The Centre for Telehealth (CEZAR centre) at the General Hospital Slovenj Gradec, Carinthia, Slovenia, has been providing home TM support to patients with heart failure (HF) and/or diabetes type 2 (DM2) since 2014. So far, about 550 patients have used the service. It is provided in parallel to the traditional care.*

Methods: *A survey on the perception of the TM service was conducted among patients within the European project UNITED4HEALTH. The patients involved were the service users for at least 12 months. An adapted standardized SUTAQ protocol was used covering both, the service and the TM equipment used in the service. In total, 363 users completed the questionnaire which was composed of 18 questions. The interviews were conducted by the CEZAR centre coordinator during the patients' regular visits to their specialist. The data were analysed using descriptive statistics.*

Results: *The patients - TM service users were generally satisfied with the form of home TM service. They rated it at 4.6 scores on a five-point scale (1 - not at all to 5 - very high). The average score of satisfaction with affirmative statements was 4.25±0.51 and the negative ones at 1.69±0.11. Their experience with the use of TM equipment was estimated high (4.49±0.96). When comparing the usefulness of personal contact with a doctor versus TM monitoring, the patients' opinions differed, but still in favour of TM monitoring (2.76±1.31). The users did not perceive the service as a disturbance of their everyday activities (1.92±1.11) or privacy (1.59±0.95), nor did they experience it as a physical or psychological inconvenience*

(1.59±0.95). An expected lack of knowledge of the patient's disease(s) at the medical staff performing remote monitoring was scored low (1.75±1.02). Similar results were obtained for potential breaching of personal data confidentiality while using TM (1.69±1.12). The interviewed patients would also recommend TM services to other patients with the same type of disease (4.56±0.78).

Discussion: *Although not fully adequate for assessment of the TM service, the obtained SUTAQ survey results show a high level of acceptance of the TM service as a new form of supporting patients with HF and/or DM2 at home. The results confirmed that the TM service model used was adequate, the technological solution was acceptable for the patients, and the organization of the TM service was effective. The high level of acceptance of the TM service was also due to its careful planning and measures taken before the inclusion of the candidates into the TM service as well as during the service provision.*

Keywords: *home telemedicine, heart failure, diabetes type 2, survey, acceptance*

Izvleček

Uvod: *Telemedicinske storitve za kronične bolnike postajajo vse bolj pomemben del podpore bolnikom v domačem okolju pri njihovi samooskrbi. V SB-SG smo vzpostavili CEnter za Zdravje na dAljavo koroške Regije (CEZAR), ki nudi telemedicinsko podporo bolnikom s srčnim popuščanjem (SP) in ali s sladkorno boleznijo (SB) v domačem okolju. CEZAR deluje od leta 2014. Do sedaj smo nudili TM podporo že okoli 550 bolnikom.*

Metode: *V okviru EU projekta UNITED4HEALTH smo izvedli med bolniki, ki so vsaj 12 mesecev bili uporabniki TM storitev, anketo o zadovoljstvu s storitvijo. V anketo je bilo vključenih 363 uporabnikov, ki so odgovarjali na 18 vprašanj standardiziranega UK WSD protokola povezanih tako s storitvijo kot uporabljeno TM opremo. Intervju je izvedla koordinatorka TM centra CEZAR.*

Rezultati: *Bolniki – uporabniki TM storitve so bili v splošnem zadovoljni s to obliko podpore na domu, saj so jo ocenili s 4,6 na lestvici od 1(sploh ne) do 5(zelo), povprečna ocena zadovoljstva pri pozitivnih vprašanjih je bila 4,3, pri negativnih pa 1,7. Izkušnjo z uporabo TM opreme so ocenili zelo visoko (4,4). Pri primerjavi koristnosti osebnega stika z zdravnikom nasproti TM spremljanju so mnenja bolnikov deljena, vendar že v korist TM spremljanja (2,7). Storitev ne sprejemajo kot motenje vsakdanjega dela (1,9) ali vdiranje v zasebnost (1,6), niti ga ne doživljajo kot fizično ali psihično neprijetnost (1,6). Dvom v nepoznavanje poteka bolnikove bolezni zaradi oddaljenega spremljanja je nizek (1,7) prav tako dvom v varovanje zaupnosti osebnih podatkov pri uporabi TM (1,7). TM storitve bi bolniki – uporabniki priporočil tudi drugim bolnikom z isto boleznijo (4,5).*

Razprava: *Uvajalci TM storitve smo zadovoljni z visoko oceno sprejemanja nove oblike podpore kroničnim bolnikom na domu, kar potrjuje, da je tehnološka rešitev enostavna in organizacija storitve učinkovita. Uporaba standardiziranega WSD vprašalnika z generičnimi vprašanji je vplivala na rezultate, saj so bila vprašanja v nekaterih delih za bolnike presplošna. Anketo bi bilo zato priporočljivo ponoviti z vprašalnikom prilagojenim za tovrsten model izvajanja TM storitev.*

Ključne besede: *telemedicina na domu, srčno popuščanje, sladkorna bolezen tipa 2, anketa, zadovoljstvo*

Introduction

Europe is facing a challenge of delivering a high quality healthcare to all the citizens at an affordable cost. Prolonged medical care for the ageing society, the costs of managing chronic diseases, and the citizens' increasing demands are major factors that contribute to the complexity problem of delivering quality healthcare. The emerging situation calls for a change in the way healthcare is delivered and the way medical knowledge is managed and adopted in clinical practice. The European Commission recognises the benefits of the new services to solve these problems. These services are based on recent models applying new information and telecommunication technologies (ICT), which have the potential to be more efficient than the current established models (EU-Commission, 2008). In future, it will be necessary to introduce these services to the healthcare systems in all the European member states to provide support to patients with long-term conditions (e.g. diabetes, heart failure or chronic obstructive pulmonary disease) in their living environment. Telemedicine (TM) services are becoming an increasingly important part of support in self-management of the patients' chronic conditions in their home environment. They are expected to help in prevention of health deterioration, medical complications and minimising the secondary consequences of the illness. The patients are likely to benefit from a timely a nd adequate response by health care providers to deteriorated conditions, which are detected by the telemedicine system upon the received data. By the TM support patients with diabetes would keep their blood glucose level within the determined interval and those with heart failure would maintain the targeted blood pressure, heart rate and body weight values. The professional challenge for the clinicians is to successfully conduct therapy at a distance to the patients living at home.

The patients' acceptance of TM services is one of the fundamental conditions for achieving the expected benefits of the TM services. More and more research is focused on analysing the experience of TM users (patients and healthcare workers), trying to measure their satisfaction with the service. A survey on the acceptance of TM as a health service was performed in the province of Veneto in Italy (Dario, et al., 2016) using the Service User Technology Acceptability Questionnaire (Hirani, et al., 2017). The results confirmed that patients with diabetes (n = 163), COPD (n = 180), chronic heart failure (n = 140) and patients with a pacemaker (n = 1635) are favourably accepting TM services as a supplement to standard healthcare provision. The positive attitude increased with the prolongation of the period of use (to 1 year). Domingo and co-workers (Domingo, et al., 2012) reported positive results of 12 months of TM use and additional motivational approaches in 92 patients with heart failure in Catalonia. In addition to reducing hospitalization time, the patients reported improvements in their quality of life. Lind and Karlsson report increasing the sense of safety by using TM solutions in patients with heart failure and comorbidity (Lind and Karlsson, 2014).

In Slovenia, TM service for patients with long-term conditions is available only from the General Hospital Slovenj Gradec (GH-SG), Carinthia. It has been provided by the Centre for Telehealth (CEZAR centre) since 2014, offering TM support to patients with heart failure (HF)

and/or type 2 Diabetes Mellitus (DM2) in their home environment (Rudel, et al., 2016). The centre and the services developed from a European R&D project UNITED4HEALTH (UNITED4HEALTH), aiming to spread the TM model, designed within the Renewing Health European project (RENEWING), to the countries that had not introduced telemedicine services. So far CEZAR centre has been used by approximately 550 patients. Three years of operation and the number of patients provide a solid base to assess the users' attitude and acceptance of the TM service. A survey research method was used in accordance with the study purpose.

Telemedicine service model description

The TM service model was described by Rudel et al (2016). A HF and/or DM2 patients using the TM service at home perform daily measurements of their blood pressure, heart rate, body weight, and oxygenation (HF patient) or blood sugar (DM2 patient) following the recommendation of their specialist regarding the time and frequency of measurements. The adequate set of measuring devices is provided by the TM service provider – the CEZAR centre. This also includes a mobile phone serving as a gateway for data transfer of the measured values. After the measurement is taken, the patient's data are immediately sent from the measuring device to the gateway and then further to the TM server in the GH-SG. That happens automatically, without any action on the part of the patient.

The TM service server compares the measured data to the pre-set individualised values for each type of data. If the measured value exceeds the individually set threshold limit set by the medical specialist, the TM centre coordinator (a nurse) receives a warning email. The coordinator calls the patient by phone to get more information on the background of the out-of-range data values. If there is any doubt to the reliability of data the measurements are repeated. When the measurements confirm a deteriorated condition, or if they are indicated by the patient him/herself, the coordinator consults the specialist on duty and informs him/her on the findings. The specialist decides on the action to be taken by the patient and advises the patient to change medication/treatment, to visit their general practitioner, a hospital clinic during regular working hours, or an emergency department in the hospital. The information is conveyed to the patient by the coordinator by phone, and later as a written report by a surface e-mail. Every phone call, advice, change in therapy, home visit or other action is registered the patient's record on a clinical portal.

Methods

Within the UNITED4HEALTH project, a survey on user's satisfaction was performed among the patients who had been TM service users for at least 12 months. The service was provided in parallel to the traditional care the patients were receiving. The survey involved 363 patients (115 HF and 253 DM2) at the end of the first year of their TM usage. The average age was 71 years for HF and 67.55±11.01 for DM2 patients (Rudel, et al., 2015). The gender proportion was 65% male vs. 35% female in HF patients and 48% male and 52% female in the DM2 patients. An adapted standardized Service User Technology Acceptability Questionnaire – STUAG protocol (Hirani, et al., 2017) was used to assess the patients' perception of the service and the TM equipment used by the patients. The interviews were conducted by the TM centre

coordinator during the patients' regular visits to their specialist. Each of the interviewees answered 18 questions, sixteen out of which referred to the quality of the service and their attitudes towards it, and two to their TM equipment. The answers were rated on a scale from 1 (do not agree at all) to 5 (highly agree). The questionnaire contained affirmative and negative statements. The responses were registered at the TM service online portal. The data were analysed using descriptive statistics.

Results

The patients - TM service users were generally satisfied with the form of the home TM service. They rated it at 4.6 scores on a scale of 1 to 5. The average score of satisfaction with affirmative statements was 4.25±0.51, 1.69±0.11 with the negative ones. The experience with the use of TM equipment was estimated high (4.49±0.96). When comparing the usefulness of personal contact with a doctor versus TM monitoring, the patients' opinions varied, but still in favour of TM monitoring (2.76±1.31). The users did not accept the service as a disturbance of their everyday activities (1.92±1.11) or privacy (1.59±0.95), nor did they experience it as a physical or psychological inconvenience (1.59±0.95). A potential lack of knowledge on the patient's disease(s) among the healthcare staff performing remote monitoring was scored low (1.75±1.02). Similar results were obtained for potential breaching of personal data confidentiality by the TM service provider (1.69±1.12). The interviewed patients would also recommend TM services to other patients with the same type of disease (4.56±0.78).

Discussion

The investigators intentionally used the standardized Service User Technology Acceptability Questionnaire – SUTAQ (Hirani, et al., 2017) to get comparable results to other studies reported in the literature. As the survey methodology was focused mostly on the assessment of the equipment acceptance, it was less adequate for the assessment of the patients' perception of the TM service. Consequently, the investigators experienced some difficulties in adapting and translating the survey from English into the native language of the patients (Slovenian).

The survey results exhibit high level of adoption of the new form of support to HF and DM2 patients at home. The TM service provider, the CEZAR centre staff at the GH-SB, gained an additional insight into the patients' perspective. The results yield an objective confirmation of what they had already observed during the service provision. They confirm that the service model used was adequate, the technological solution acceptable and the service organization effective. The results also reveal that the patients adopted the new means of support from a distance. This may be influenced by the fact that the TM service was provided in parallel to the continuous traditional care. Therefore, the findings are in line with the conclusion of Dario and co-workers (Dario, et al., 2016) that TM was perceived as a viable addition to the usual care.

The UNITED4HEALTH project group that designed and set-up the TM service is convinced that the high level of acceptance of the service was also a consequence of a careful planning of the TM service (Rudel, et al., 2014). Several measures were implemented to mitigate potential risks of rejecting the new service and to overcome potential barriers before the inclusion of the

candidates into the TM service as well as during the service provision. Measures to support the patients' acceptance of the TM service before inclusion in the service were:

1. The candidates for using the TM service had been carefully selected before they were invited for potential inclusion, using UNITED4HEALTH inclusion criteria (Stafylas et al, 2016). Additionally, potential benefits for each patient from TM monitoring were considered, including the patients' mental condition to understand the new way of support, expectations and possible fears of not performing well.
2. Health professionals involved in the TM service provision were trained in advance to gain skills on the use of the TM equipment at the TM centre and also those given to the patients. They were able to give advice to the patients in the case of the equipment malfunction.
3. Invitations for accepting the TM support were issued by specialist doctors or by clinical nurses whom the patients knew from their regular visits and trusted.
4. The invited patients were informed on the TM service, the requirements, and expectations by the medical staff.
5. The patients were trained on how to use the equipment prior to their enrolment in the service. A sufficient number of skilled trainers were present at the group training sessions to ensure that all patients became familiar with the service and the technology.
6. The patients were provided with relevant oral and written instructions on the TM service and the equipment.
7. The data acquisition by the mobile phone and transfer of data to the CEZAR centre was automatic and did not require any intervention on the patients' side.

Measures to support the patients' acceptance of the TM service during the service provision were:

1. Adequate organizational and technical support to the patients, the TM service users (the primary level support).
2. Adequate and responsive technical support to the service provider – the CEZAR TM centre (the second) and the service infrastructure (the third level) was available throughout the service provision period.
3. The healthcare workers at the CEZAR centre maintained a friendly relationship with the patient.
4. The TM staff regularly responded to the system warning messages and timely reacted to the detected health deterioration.
5. Adequate communication of the results of the remote monitoring with the patient (telephone, SMS, written reports) or at the patients' regular examinations aiming to adapt the patients' self-management care programme.

There were some additional factors influencing the service acceptance:

1. The HF and DM2 patients performed the measurements at home as a part of their traditional self-care management procedure even before they were enrolled in TM service. Their former equipment was replaced by the one with similar functions, but it enabled automatic data transfer to the TM centre (built-in a Blue-tooth interface).

2. The main fear of the medical staff before the TM service introduction was that the patients, candidates for the TM service, would decline the enrolment into the service because it required the use a smart mobile phone. It was the only novelty for the patients but did not require any action intervention on their part. The phone was permanently switched ON in a standby mode and powered by a charger.
3. All patients who needed an additional support at their self-management of the chronic disease were receiving it from their carers (relatives). They were also trained to manage the TM measurements together with the carers. In some cases, this support was crucial in taking a decision to participate in the TM service.
4. TM service was delivered free of charge for the patients. The patients did not receive any financial compensation for their participation in the study.

The positive acceptance of the TM service by the patients encourages the service providers at the CEAZR centre to further individualise the service and upgrade it with new functions, e.g. informing the patients regularly on their health status through SMS messages.

The positive experiences gathered with TM service suggest that there is a possibility to scaling the use of TM among older people by developing a greater understanding of their psychological impediments and their personal perceptions of the TM service. Research on the changes in the relationship between the service provider medical staff and the patients using the TM is necessary to find new ways to help patients, medical staff, and service providers to use all the potentials of TM.

Conclusion

Although not fully adequate for the assessment of the TM service, the implemented SUTAQ survey results show a high level of acceptance of the TM service as a new form of support to patients with HF and/or DM2 at home. The results confirmed that the TM service model used was adequate, that technological solution was acceptable for the patients and that the organization of the TM service was effective. The high level of acceptance of the TM service was also due to its careful planning and measures taken before the inclusion of the candidates into the TM service as well as during the service provision. Additional factors influencing the service acceptance were: (a) simplicity of the service use (the patients were already familiar with the measurement procedures before they were enrolled into TM service and (b) no action was required from the patient when transferring measurement data to the TM centre.

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USING MOODLE IN THE HEALTH EDUCATION OF PATIENTS WITH DIABETES

UPORABA MOODLE PLATFORME V ZDRAVSTVENI VZGOJI

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Abstract

Introduction: *The breakthrough of information communication technology has also contributed to innovative patient health education. The most widespread chronic non-communicable diseases require extensive patient knowledge to control the disease and maintain the quality of life. This study explored whether the Moodle platform could be an appropriate tool for delivering patient online health education on the topic of diabetes and probed patient satisfaction with such health education.*

Methods: *The chosen research approach was an intervention pilot study. The intervention consisted of successive phases: preparation of a health educational module on the Moodle platform, testing of the module by the end user and user satisfaction evaluation. A convenience sample of one male adult was selected. Their blood sugar was too high at two consecutive measurements and the study was performed in spite of the normal Hb1Ac value since this person also had other diabetes risk factors.*

Results: *Knowledge of diabetes increased after using the online education platform. In the second test, the user achieved a higher score and gained additional knowledge. With the help of evaluation questions, valuable impressions and experiences of the user were acquired and thereby also the opportunity for future improvement of the method and additional research in the area.*

Discussion: *The possibilities of using the Moodle Platform in Health Care are diverse, but for their effectiveness there is currently little to no scientific evidence. Using the Moodle platform in patient health education could increase access to verified health-related information and impact public health in the long run. A preliminary case study can serve as a basis for further research on online health education and health promotion.*

Keywords: *information communication technology, e-learning, adult health education, case study*

Introduction

Information and communication technology (ICT) use nowadays tends to begin at a very early age. Doubts in favor of such early use of electronic devices are still present, although every adult must possess some level of digital literacy today. Nursing has already made great progress in the field, but there are still many possibilities for improvement, such as using ICT in the health education of patients with chronic diseases. Health education is defined as any combination of learning activities developed to help individuals and communities improve their health. Health education activities increase the knowledge of an individual or the community and influence their attitudes towards health (WHO, 2017).

Diabetes is a chronic metabolic disease where health education is vital in teaching the patients to achieve greater control over their blood glucose level and reduce diabetes-related complications (NIJZ, 2017). One recent study from India on 385 patients with type 2 diabetes found that lower knowledge about diabetes is associated with lower levels of education and is a predictor of poorer blood glucose level control. The average grade diabetes patients achieved on the diabetes knowledge test was 3.79 points out of 7 (Basu, et al., 2017). Due to the divide between the mediated and acquired knowledge, it may be time for nurses to start using new tools and approaches in order to improve patient knowledge about diabetes. One of these tools could be the online education platform called Moodle.

Moodle is a free access platform that offers educators and learners a robust, secure and integrated system that can create diverse learning environments. Software can be installed on a server, and currently Moodle has over 90 million academic and business users. Every user can adapt, expand or change Moodle freely, which means that the platform is constantly upgrading and improving according to the changing needs of its users. It is suitable for all: smaller groups of students or large enterprises, for both learning and teaching. It can be accessed via any device and various internet browsers. The project has a large online community and official forum, and this community is also credited with translating Moodle into 120 different world languages (About Moodle, 2017). Moodle is also used in Slovenia's educational system, including the University of Ljubljana.

The aim of this paper is to present the intervention pilot study, which prepared a Moodle classroom that could assist nurses in implementing programmed health education for newly diagnosed diabetes patients. A secondary aim of this research was to check how suitable Moodle might be for using various healthcare education materials in online education.

Methods

We used a descriptive research method to answer the following research questions:
1. Is Moodle a useful tool for delivering patient health education?
2. How satisfied are users with online health education methods?

A pilot intervention study was conducted on the case of one adult male. The intervention included preparation of the learning module in Moodle, testing by the end user, and evaluation

of user satisfaction with the module. Patients with diabetes were chosen due to the prevalence of the disease and the extent of valid scientific knowledge.

Moodle user characteristics

An adult male was conveniently chosen to test the module during his diabetes diagnostic process. Due to his professional expertise (senior web developer), he was also qualified to comment on the usability of Moodle. His fasting blood glucose value was measured to be above 7.0 mmol/l on two consecutive occasions and at the time of the intervention the results of the Hb1Ac levels test were still pending. After the intervention had already begun, the user learned that Hb1Ac levels were "within normal range". Due to the user's high motivation and a simultaneous presence of other risk factors for type 2 diabetes development, the intervention continued as planned despite the Hb1Ac test results. User characteristics are summarized in Table 1.

Table 1. User characteristics

Characteristic	**Value**
Gender	Male
Age	45
Education level	VI/1
Body mass index	34.1*
Blood pressure	145/95*
Waist circumference	109 cm*

*Measured on the day of first knowledge test, 26 Nov 2017

Intervention

The intervention took place in November 2017, consisting of two phases: preparation of learning materials and implementation of the e-learning process. In the first phase, a quiz was prepared to establish the level of existing knowledge and a lesson covering all diabetes-related issues for any potential patient. A document containing instructions for access to Moodle (courtesy of the University of Ljubljana, Faculty of Health Sciences), was also prepared. When the user replied to the instructive email, they received another e-mail, containing the Moodle user access data. At the end of the first phase, a knowledge quiz was attempted, and on the basis of incorrect answers, the user was then given access to personalized content of the lesson. The user was offered the possibility of taking the class in a home environment, and had Skype contact with a registered nurse the entire time. Time for the quiz was limited to 15 minutes, and the quiz was visible to the user only on the day they received the e-mail with access information. The date and time were agreed upon beforehand. In the second phase, an identical quiz was given to the user containing three additional open-ended questions at the end to

evaluate user satisfaction. We allowed five extra minutes for the additional questions. In the end, the differences in answers between the first and the second quiz attempt were observed.

The lesson

After reviewing the results of the first quiz attempt, a personalized lesson with six content areas was constructed and offered to the user. Recent scientific literature gained through the MEDLINE database was used in the construction of the lesson. The learning units were as follows: Types of diabetes, Blood sugar levels, Diet and diabetes, Diabetes and periodontal disease, Insulin and Physical activity. The plain text was enriched with images, videos and links to verified external websites that might offer the user further information.

The user had the possibility to check new knowledge with a single question after each processed unit, but could also continue the lesson without verification. In the case of a correct answer, the lesson continued, while incorrect answers automatically returned the user to the page containing the correct answer. The lesson was linked to the quiz, so the user could re-evaluate knowledge after finishing the lesson without having to search through the entire classroom. The lesson was not limited in time.

Measuring instrument

The diabetes knowledge quiz was based on the questions from the national competition, diabetes knowledge for secondary schools, carried out by the Association of Diabetes Associations of Slovenia (Slovene ‘Zveza društev diabetikov Slovenije’). Some questions were adapted according to the Diabetes Knowledge questionnaire (Garcia et al., 2001). The quiz consisted of 20 questions with a total of 31 points. During the first attempt the questions were set to appear in random order. During the second attempt we locked their positions, so the evaluation questions would remain at the end of the quiz. Four types of questions were used in the quiz: true/false, multiple choice, numerical short answers and matching. In the second phase, two additional types were added: short answer and essay, for evaluation purposes. These questions were not scored.

Results

The user scored 71 % during the first quiz attempt and took 7 minutes to finish. The second attempt, after the lesson, scored 90 %. A comparison of the two attempts can be seen in Table 2. Since the second quiz had three extra questions, the time allowed for the quiz was extended, with the additional option of "allow additional time to finish quiz", allowing the quiz to be fully completed despite having reached the time limit. This option was selected because of evaluation questions, where predicting the time needed to answer was not possible. No extra time was actually needed.

Table 2. Knowledge quiz attempts before and after the lesson

Value	First attempt	Second attempt
Incorrect answers	5+2 partial	1+1 partial
Points achieved/maximum possible points	22/31	28/31
Time needed to complete quiz (in minutes)	7	7

Lesson

The lesson was completed in approximately 20 minutes with real-time assessment of knowledge. All questions were answered correctly on the first attempt, except for the last question, where the formula for calculating the maximum heart rate had to be written down. Due to the pre-configured Moodle quiz options, this has to be done exact to the character. This was pointed out in the lesson, but the explanation was still unclear. The user successfully answered the question after a Skype consultation, with the nurse advising to use the copy-paste function. The user's self-reported diabetes knowledge was higher than before e-learning (Table 3).

Table 3. User evaluation of Moodle

Question	Answer
Do you believe you now have more knowledge on diabetes than you had prior to participating in Moodle?	Yes
What did you like best about this course?	The possibility of participating from my own home at the time of my own choosing.
What bothered you the most about this course?	Slightly clumsy interface

During the Skype consultation, the user informally assessed the usefulness of the Moodle classroom itself with grade 4 (minimum 1, maximum 5).

Discussion

In Slovenia, patients with chronic non-communicable diseases are offered health education and encouraged to join group workshops where they obtain vital information about their disease and treatment. At the same time, they are directed towards positive lifestyle changes (Zaletel, et al., 2017). The existing forms of health education have many advantages including hands-on exercise, social contact and experience exchange. People with chronic non-communicable diseases can receive verified information in this way, but the question is whether all patients

can process all the information properly in the limited time available. Also, is the knowledge understood and internalized by all patients, and is the classic method sufficient for all learning types? Nurses must step into the future and think about the different possibilities for enhancing patient education. Today, the worldwide web is overflowing with a wide variety of data. A nurse's duty is also to provide reliable sources of information and increase patient health literacy.

Abroad, online education has been a long-established way of acquiring knowledge and has also gained popularity in health education. Burns et al. (2013) have demonstrated on 51 patients with asthma that online health education is an appropriate way to improve the knowledge of chronic disease in the elderly population. The participants also increased their asthma control and quality of life, but they were people who had been using the internet for more than 5 years. In order to increase participation, the authors offered a prize draw and discount coupons. A similar study on 229 patients waiting for bariatric surgery reported the success of Moodle in increasing patient attendance at the first appointment. After one year, a group of patients who took part in e-learning prior to surgery had better results in weight loss compared to a group of patients treated by following the old guidelines. On average, users rated their satisfaction with online classrooms at 3.98 (out of 4) (Brown, et al., 2016). Both studies evaluated the difference in knowledge using a repeated measures approach, which also seemed most appropriate for our study. The disadvantage of our study is obviously the size of the sample, but the encouraging results may prompt other researchers to continue research in this area. Reis et al. (2015) compared Moodle with traditional teaching methods in their urology class for 40 medical students. 86 % of participants found Moodle to be more useful and student friendly to traditional lectures. The acquired knowledge was found to be better for Moodle users, who had received higher grades (7.0-9.7) than their classic lecture colleagues (4.0-9.6).

We have observed numerous advantages of online health education, most notably the user's ability to choose the time and place of learning. The user also took advantage of a real-time consultation with the nurse. It is possible that users of an online classroom take advantage of Internet access in order to find the correct answers. This can be avoided by limiting the available time and by limiting access to a preset time period. We should emphasize that the purpose of online health education is not knowledge assessment, but primarily to examine the existing knowledge and to encourage the acquisition of new and relevant information.

Diabetes is a major challenge for any health system due to its prevalence, complex treatment and unpleasant consequences (NIJZ, 2017). For diabetes patients, it is vital that we present them with more than just treatment options. Type 2 diabetes in particular, presents a wider problem where giving up the unhealthy lifestyle is key. Healthcare professionals must also pay attention to the skills that the patient must acquire, and this cannot be achieved through e-education only. Also, a behavioral change towards better health must be achieved, and this in most cases requires a long-lasting personal contact between the patient and experienced health educator.

The Moodle platform is currently widely used mostly by younger generations, especially in schools. This population, that is increasingly aware of computer technologies, should come

across healthcare content online since these generations are already at risk for many chronic illnesses. It is necessary to take preventive actions and prepare possible solutions before major public health problems, including diabetes, become unmanageable. The pilot study has shown that Moodle is undoubtedly a successful tool for increasing factual knowledge on specific health topics. Knowledge has increased by 19 % and at the end of the intervention the user agreed that online classrooms are a major step in the right direction. On the basis of their own professional experience in the field of ICT, the user emphasized that long lasting lessons and knowledge tests can lead to a loss of motivation and early termination of the course. They also advised against adding external links to online classrooms as they could drive users from the Moodle site. A drop in motivation was also observed during the completion of evaluation questions and more information was actually obtained via Skype. Moodle's online classroom of the Faculty of Health Sciences that was used for this study should be upgraded to better suit the needs of users less likely to be skilled in using ICT devices. Online education classrooms have already been designed in Moodle by nursing students in Slovenia. Milavec Kapun et al. (2017) note that such a form of education is not yet firmly established in Slovenia despite the fact that there are numerous needs for it, such as the continuing nursing education for nursing license renewal.

In the future, it might be useful to test the existing or expanded lessons on a larger number of patients and also to test populations with less or no experience in Internet use.

It would be interesting to assess the applicability of e-education within existing diabetes monitoring mobile applications. In the last decade, both abroad and in Slovenia, numerous improvements have been made in the field of m-health and diabetes (Vrbnjak, et al., 2015). It would also be sensible to try to introduce online education into day-to-day health education and health promotion.

Conclusion

Moodle can be a good tool for nurse health educators, but requires a lot of motivation from both the provider and the user, not forgetting the digital literacy level of patients and nurses. In the future, nurses should focus on establishing this type of health education in order to familiarize the general public with it. Every bit of acquired knowledge is an invaluable resource of every individual, empowering them to start managing their health on their own.

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THE IMPACT OF COMPUTER USAGE ON THE PREVALENCE OF HEADACHES AMONG SECONDARY NURSING SCHOOL STUDENTS

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Abstract

Introduction: *Computer usage is a part of everyday life for a large number of adolescents, both at school and in their leisure time / out-of-school activities. Frequent computer use could have many negative consequences on the health of the users, such as vision, neck pain and headache. Since headaches are one of the most common neurological symptoms, the aim of this study was to investigate the impact of computer use on the onset of headaches.*

Methods: *The study was conducted as a cross-section study by interviewing students of the Secondary Nursing School in Sombor. The sample consisted of 172 students, and the study instruments were: a scale for assessing computer use and behaviour while working on a computer, a questionnaire for the classification of headache type and a questionnaire related to demographic data. The questionnaire for the classification of headache type was designed according to the criteria of the International Classification of Headache, and was completed only by respondents who had experienced headaches in the past year. Descriptive and inferential statistics were used for data processing.*

Results: *The majority of the surveyed students, 130 (79.3%), had experienced a headache in the previous year. 77 of them (47.0%) reported long-term work on the computer as being a potential cause of their headache. The occurrence of the headache was attributed to working without taking a break of at least 15 minutes per every hour of work on the computer ($p = 0.005$). With the largest number of students who experienced a headache, a headache occurred more than once a month. The quality of pain was pulsating, moderate and an attack usually lasted from 15 minutes to 3 hours.*

Discussion: *Headaches in both adults and adolescents are not given enough attention, and many people would need an adequate diagnosis and treatment. The results of the study indicate that it is necessary to educate students about the application of preventive measures. Raising awareness of computer use as a potential trigger for the onset of a headache could significantly contribute to the reduction of absenteeism from school, more effective learning, and better use of leisure time.*

Key words: *computer, headache; nursing students*

Introduction

The development and use of information technologies has increased dramatically over the past two decades. These technologies have become a part of everyday life (Woo, White and Lai, 2016). Wide availability of computers resulted in their excessive use among the majority of adolescents on a daily basis, not only as a part of their schoolwork, but also as leisure / out-of-school activity (Saueressig, et al., 2015). For their schoolwork, students use computers to complete a range of tasks such as text editing, searching for information on the Internet or using specific educational software. Also, they use computers at home for doing their homework, communicating or playing games (Woo, White and Lai, 2016). The application of computers plays a role in improving the quality of teaching and learning. Due to an increasing availability of electronic devices, students spend more time on computers, which negatively affects their health. A sedentary lifestyle in general and sitting in front of a computer in a relatively fixed position for prolonged periods of time can result in neck and shoulder pain, headache, vision problems, fatigue, depression, anxiety, sleeping disorders, being overweight and other conditions and diseases associated with the development of potential chronic lifelong health problems (Iannotti, et al., 2009; Ojini, Okubadejo and Danesi, 2009; Smith, et al., 2009; Saueressig, et al., 2015; Woo, White and Lai, 2016).

Headache is one of most prevalent neurological symptoms in both the paediatric and adult population (Kurt and Kaplan, 2008). According to the International Classification of Headache Disorders (3rd edition - beta version), from 2013, headaches are categorized into primary and secondary headaches. Primary headaches encompass those manifesting specific characteristics and frequencies such as the migraine of a tension-type headache (TTH). According to a number of epidemiological studies, migraine is a highly frequent incapacitating primary headache with a substantial socio-economic and personal significance. Tension-type headaches are also highly frequent with prevalence rates ranging from 30 to 78% and have a considerable socio-economic impact (IHS, 2013). A range of triggering factors, both single ones or a combination thereof, can contribute to the development of a headache in susceptible individuals. Such triggers are mostly associated with migraine and TTH. The headaches in individual patients are associated with different triggers; however, even in the same person, different episodes can be associated with different triggers. Identification of such triggering factors is of key importance in view of advising the patient on how to avoid them in order to prevent headaches from becoming chronic, decreasing drug consumption and improving the quality of life (Montagni, et al., 2015; Radmilo and Simić, 2016). The occurrence of headaches in medical students is associated with a number of physical and psychological triggering stressors, which results in a somewhat increased prevalence of headaches among them as compared to the general population (Ghorbani, et al., 2013; Lebedeva, et al., 2017). One of the stressors proved to significantly contribute to the occurrence of a headache is the use of computers. A study conducted by Xavier, et al. (2015 cited in Saueressig, et al., 2015, p.247) has established that the probability of developing a headache is 1.52 times higher in students who abusively use electronic media.

Moreover, Saueressig, et al. (2015) established a 2.54 times higher risk of migraine in adolescents who use the computers excessively (more than 3 hours daily).
Considering that headaches are one of the most common neurological symptoms, the aim of this study was to investigate the effects of computer use on the occurrence of headaches in students of the secondary nursing school.

Methods

The study was designed as a cross-sectional study encompassing students of the Secondary Nursing School in Sombor, who were interviewed during March 2017. The questionnaire was completed by 172 final-year students, and the following instruments were used: Basic questionnaire of demographic data (sex, history of chronic diseases, potential medication use, other kinds of pain), the scale for assessment of computer use and behaviour while working on a computer and the questionnaire for headache classification. In order to be considered for inclusion in the study, students had to be over 18 years of age and provide a written consent to participate in the study. In the instructions for completing the questionnaires, the students were asked to provide answers to all the questions. Incompletely filled questionnaires were not taken into consideration for statistical data analysis. The written consent for this research was obtained from school management. The Scale for assessment of computer use and behaviour while working on a computer was designed especially for the purpose of this research according to the data from the literature. Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity revealed that the sample was representative enough and thus suitable for factor analysis. The required KMO test result must be >0.50, and the result obtained for the sample in this pilot research was 0.59. The result of Bartlett's test should be significant, that is p <0.05. The result obtained in this research was 0.000. The obtained results satisfied the criteria for further factorization and assessment of factor structure of the applied scale. Exploratory factor analysis revealed that the scale cannot be considered for the measurement of a single component, that is three weakly interrelated factors can be distinguished. These three factors explain the 64.53% variance of the investigated phenomenon. The first factor – time of exposure to computer - was addressed by questions 1, 2, 3 and 4. The second factor – a break after using a computer - was addressed by questions 5 and 6. The third factor – body position during working on a computer - pertains to questions 7 and 8. The reliability of the total scale is very low, with a Cronbach alpha coefficient being 0.31, which again reveals that the scale is not consistent. However, the assessment of the reliability of the subscales isolated by factor analysis revealed a high reliability of the first subscale, i.e., the first isolated factor, being 0.74 (Cronbach alpha coefficient higher than 0.70 is considered satisfactory). As for the second subscale, a somewhat lower reliability was confirmed at 0.60. With an adjustment for questionnaires with less than five items, the reliability rate reached 0.70, which was considered acceptable for this research. The Questionnaire for the classification of headache type was designed according to the criteria of the International Classification of Headache Disorders, 3rd edition (beta version) (IHS, 2013) and was completed only by respondents who had had a history of headaches during the past one-year period.

The Statistical Package for Social Sciences - SPSS 21 software package - was used for statistical analysis. Data processing included descriptive and inferential statistics. Differences

in the frequency of attributive features were assessed using the χ^2 test. The significance p-value <0.05 was considered statistically significant.

Results

The research encompassed 172 students of the final (fourth) grade of the Secondary Nursing School in Sombor. The questionnaire was completed in full by 164 (95.39%) students, 130 (79.3%) of which were females. A headache during the previous one-year period was reported by 2/3 of students (n = 130; 79.3%). The majority of respondents used the computer for less than two hours at school (n = 105; 64.0%) and at home (n = 87; 53.0%). A little more than a half of students (n = 84; 51.2%) confirmed using a computer for less than two hours a day. The same number of students reported to use the computer for less than 24 hours weekly, while 68 (41.5%) use the computer 24-72 hours weekly. The lowest number of students (n = 12; 7.3%) reported on using the computer for more than 72 hours weekly. Two-thirds of students (n = 114; 69.5%) occasionally take a break from using a computer, while only 13 (7.9%) take breaks regularly after one hour of using a computer. In the majority of students (n = 76; 46.3%), the break takes up to 15 minutes, while the lowest number of students (n = 32; 19.5%) take a break of about one hour. One-third of the students (n = 51; 31.1%) responded that they 'never' or 'sometimes' sit in a proper position while using a computer, that is with their "back straight, shoulders slightly back, elbows on the desk and hands lined up with the elbows". The chi-square (χ^2) test revealed a significantly higher prevalence of headaches in students with a family history of headaches (p = 0.035) as well as in students who reported neck and shoulder pain (p = 0.021). Moreover, the test indicated a significantly lower prevalence of headaches in students who reported to regularly take breaks of about an hour after each hour of working on the computer (Table 1).

Table 1. Variables from the basic questionnaire and Scale for assessment of computer use proved to significantly contribute to the occurrence of headaches according to the chi-square test

			Headache status			
	Total		No headache		Headache	
	n	%	n	%	n	%
Family history of headaches						
No	91	55.5	24	26.4	67	73.6
Yes	73	44.5	10	13.7	63	86.3
$\chi^2(1, n = 164) = 3,966, p = 0,035$						
Neck and shoulder pain						
No	115	70.1	29	25.2	86	74.8
Yes	49	29.9	5	10.2	44	89.8
$\chi^2(1, n = 164) = 4,713, p = 0,021$						
Break after 1 h computer use						
No break	21	12.8	4	19.0	17	81.0
about 15 min	76	46.3	8	10.5	68	89.5
about 30 min	35	21.3	8	22.9	27	77.1
about 1h	32	19.5	13	40.6	19	59.4
$\chi^2(3, n = 164) = 12,740, p = 0,005$						

n = *absolute frequency*; % = *relative frequency*; χ^2 − chi-*square test*; p − *significance*

According to Table 2, it is apparent that almost two-third of students (n = 82; 63.1%) suffer more than one headache episode monthly. According to the localization, bilateral temporal headaches are the most prevalent (n = 52; 40.0%), whereas the quality and intensity of pain are mostly described as throbbing/pulsating (n = 67; 51.5%) and moderate (n = 89; 68.5%), respectively.

Table 2. Headache characteristics in students of Secondary Nursing School

	Students	
	n	%
Total	130	100.0
Characteristic		
Number of monthly episodes		
< 1	48	36.9
1 – 14	74	56.9
> 15	8	6.2
Predominant localization		
Unilateral – always the same side	17	13.1
Unilateral – different sides during different episodes	30	23.1
Bilateral temporal	52	40.0
Diffuse	19	14.6
Other	12	9.2
Most common type of pain		
Throbbing/pulsating	67	51.5
Tightness/pressure	55	42.3
Other	8	6.2
Most common intensity of pain		
Mild (1-3)	21	16.2
Moderate (4-6)	89	68.5
Severe (7-10)	20	15.4
Duration		
15 minutes to 3 hours	83	63.8
4 to 72 hours	33	20.1
Several days, maximum 7 days	13	10.0
More than 7 days	1	0.8
Associated features*		
Aggravation by physical activity	57	43.8
Nausea	36	22.0
Vomiting	11	8.5
Photophobia	69	53.5
Phonophobia	70	53.8
Tension and increased sensitivity of head and neck muscles to palpation	69	53.1
Pre-indication signs		
Yes	15	11.5
No	115	88.5
Contributing factors – potential triggers *		
Overstrain	89	68.5
Prolonged work on computer	77	59.2
Menstrual cycle	53	40.8
Psychic tension	96	73.8
Changes in atmospheric pressure	60	46.2
Consumption of particular food	2	1.5
Consumption of particular beverages	21	16.2
Strong smells/odours	35	26.9
Prolonged period of unfavourable body posture	11	8.5

**More than one feature may be listed per individual*

Four out of five students (n = 105; 80.7%) reported at least one factor, i.e., potential trigger, contributing to headache. Potential triggers reported by the majority of students included psychical tension (n = 96; 73.8), overstrain (n = 89; 68.5%) and prolonged work on the computer (n = 77; 59.2%). In the majority of students reporting the latter headache trigger, a headache occurred after two to six hours of working on a computer (n = 75; 46.0%), one to two hours (n = 70; 42.9%) and in only 18 after using computer for more than six hours. The chi-square test revealed that prolonged work on a computer was more frequently reported as a headache trigger by female students ($\chi^2(1, n = 130) = 3,760$, $p = 0.045$). This trigger was identified by more than two-thirds of students (70.1%) who use computers for more than two hours and by 47.6% of those who use it less than two hours daily. The established difference between these two groups of students is statistically significant, being ($\chi^2(1, n = 130) = 6,825$, $p = 0.007$). For the same headache trigger, a statistically significant difference ($\chi^2(3, n = 130) = 8,803$, $p = 0.032$) was established between students who use the computer for more than 72 hours weekly as compared with those who use computers for 24-72 hours and up to 24 hours.

Discussion

In our study, 79.3% of participants reported to have suffered headaches during the past year. A headache incidence of 87.8% among adolescents was reported by Saueressig et al. in 2015, who emphasized that such an incidence rate is very high and was reported in several other studies. Moreover, the headaches are often neglected in both adults and adolescents, thus a lot of patients do not receive adequate diagnosis and treatment (Pogliani, et al., 2011; Montagni, et al., 2015). The available literature data show a substantial discrepancy with respect to the headache prevalence rate, which is likely due to different research methodologies and study designs, headache classification, age of the respondents, analyzed time periods for the occurrence of headaches (three months to one year), and similar (Kurt and Kaplan, 2008; Saueressig, et al., 2015; Wang, et al., 2016).

Several studies revealed a high prevalence of headaches among medical students, ranging from 46% in Nigeria (Ojini, Okubadejo and Danesi, 2009), 58.7% in Iran (Ghorbani, et al., 2013) to even 91% in Brazil (Ferri de Barros, et al., 2011) and 92.9% in Russia (Lebedeva, et al., 2014). The obtained results can be attributed to the hypothesis that lifestyle during the studies is linked to the well-established triggers such as emotional and physical stress, poor sleeping and eating habits (including abusive use of caffeine and other psychoactive substances) (Ferri de Barros, et al., 2011). According to the aforementioned studies, headache prevalence is higher in female students. In our study, there was no statistically significant difference in the gender-related prevalence of headaches. However, the responses of female students to the question “Does prolonged work on computer contributes to the occurrence of headache” suggested that this headache trigger was significantly more prevalent among the female population.

Considering that computers are a vital part of almost everyone’s everyday life, some studies have suggested that the high prevalence of headaches is associated with their use (Smith, et al., 2009; Montagni, et al., 2015; Saueressig, et al., 2015). Work on a computer is identified as a single trigger as well as a part of the set of triggers in a so-called combined effect of headache triggers, especially in relation to migraine and TTH (Radmilo and Simić, 2016). Montagni et

al. reported on two potential scenarios explaining the effects of the screen on the development of migraine-type headache. The first one is screen frequency, which can directly trigger an episode. The second one is the time of exposure to the screen that can reduce the threshold for headache development, which is then easily induced by other factors (Montagni, et al., 2015). Almost half of the students participating in our study use computers for less than two hours a day. Woo, White and Lai (2016) reported that two out of three adolescents in the USA use computers for more than four hours a day and in Hong Kong for 2.5 hours. Saueressig et al. (2015) calculated that their respondents used computers 3.83 hours a day on average, that is 228.75 minutes weekly. In our study, the respondents who used the computers for more than three hours a day had 3.44 times more chance to develop a headache, particularly a migraine. The authors reported that, according to the literature data, the 'overload' of the visual system as well as prolonged inadequate body posture during computer use is implicated in the occurrence of a headache. Both the present study and several previous studies revealed that the symptoms of a headache were significantly more frequent among students suffering from cervical pain. Work on a computer during a prolonged period of time can be stressful for the trapezius muscle, thus causing pain in the neck-shoulder region as well as headache. Trapezius myalgia can occur as a consequence of prolonged sitting and working with a keyboard and is common in individuals with poor body posture as well as in a non-ergonomic environment, e.g., improperly positioned display (Jacobs, et al., 2013; Woo, White and Lai, 2016). Reduced neck-shoulder pain can be accomplished by complying with the standard ergonomic guidelines on setting up classrooms and other spaces with computers. Cumulative effects of all headache triggers are also enhanced by micro-pauses of only 5-10 minutes between classes when computers are used, which usually last for 40-45 minutes (Smith, et al., 2009, Jacobs, et al., 2013). The results of our study are consistent with these reports, that is the prevalence of headaches is significantly higher in students who do not take breaks or the breaks are shorter than 15 minutes. The outcomes of a six-year ergonomic training program in Boston, USA, performed with students using notebook computers indicated its numerous benefits for students' health. In addition to training on ergonomic workplace settings (at school and at home), display position, guidelines for breaks (duration and activity), change and the maintenance of proper ergonomic body posture, and the use of additional external equipment for notebook computers such a mouse and a keyboard proved particularly beneficial (Jacobs, et al., 2013). Increasing awareness of computer use as a potential trigger for headaches can substantially contribute to decreasing absences from school, more effective learning and better quality of leisure time. During adolescence, such measures could prevent the chronic use of analgesics (Montagni, et al., 2015; Saueressig, et al., 2015).

The limitations of our research are mainly related to the resources. The limited time for one school class determined the limited number of questions. We were not able to include questions that would indicate the time of exposure to other electronic devices with display, data on BMI, physical activity of students, sleeping quality, managing the discomfort associated with headache (drugs, self-medication, herbal products and other alternative and complementary therapies). Moreover, a more precise assessment of the headache type, not only migraine and TTH, calls for additional questions and a more complex statistical data analysis. However, disregarding the study limitations, we can identify potential headache triggers as well as the

necessity for the development and application of prevention measures and diagnostic methods to provide people suffering from headaches with adequate diagnosis and treatment.

Conclusion

According to our study, headache symptoms were significantly more prevalent in students with a positive family history, neck and shoulder pain as well as among students who use a computer without taking a break after one hour or whose breaks are shorter than 15 minutes. Prolonged work on a computer is the third reported trigger for headache development, after pychical tension and overstrain. Future research focused on all electronic devices with a display should improve our knowledge and understanding of potential triggers and mechanisms of headache as well as enable the development of preventive proactive strategies.

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OPTIMAGE AS A SOFTWARE SOLUTION FOR IMAGE QUALITY CONTROL IN COMPUTED TOMOGRAPHY

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Abstract

Introduction: *A quality control test is used to achieve the highest levels of quality for tomography devices. Optimage is based on the digital control of image quality through an evaluation of test images with diagnostic images transmitted via the intranet to the computer where the images are processed by the Optimage software.*

Aim: *The aim of the research is to obtain information about bringing the Optimage software tool into clinical practice, and to study the automation of the quality control process for testing the quality of the computerized tomography image.*

Methods: *The study was performed in the Čakovec county hospital in Croatia in the period from August to September 2016. In our study, we used information obtained with GE Healthcare Optima CT660 according to the standard quality control protocol, with GE Healthcare phantom for checking the quality of CT images. On the basis of daily scanning measurements taken with GE Healthcare phantom, all images were analysed with Optimage software.*

Results and discussion: *The Optimage software offers a graphical result representation of each parameter over time. All the obtained values were within the reference values. We have studied the impact of load devices for computer tomography on quality parameters. According to the level of risk ($p > 0.05$), the impact was not statistically significant for the value of CT number, noise, and uniformity. Utilization of the unit and the value of uniformity in the centre of the phantom are marginal, but statistically significantly associated ($r = 0.640$, $p = 0.043$). The linear regression model showed us that the impact of time on quality parameters of CT is not statistically significant ($p > 0.05$). By analysing one-way ANOVA, we found that the differences in the value of HU (Hounsfield units) in different ROI (region of interest) are not statistically significant ($F = 0.901$, $p = 0.472$).*

Conclusion: *With Optimage we automate quality control procedures; thus become more predictable and include less chance of error. Therefore, Optimage is an excellent contribution from the point of view of application because medical staff can work with medical devices much easier. It also allows for a constant level of picture quality.*

Keywords: *quality assurance, quality control, computer tomography, Optimage, software, SANTEC.*

Introduction

In modern medicine, various radiological diagnostic procedures are performed, in which patients sometimes receive high doses of radiation, and the cost of diagnosis according to the equipment and the necessary resources is very high. One example is CT, which offers ideal options for investigating and creating a detailed image of the interior of the subject (Pavčnik, et al., 2001) and as a diagnostic method, it enables the display of images of sections of the human body with very high contrast resolution and therefore good tissue transparency (Jerrold, et al., 2002). The determination of the compromise between the quality of diagnostic information obtained with an X-ray image and the dose received by the patient is an important issue regarding the protection of the patient against ionizing radiation. Each individual procedure has an impact on image quality and can consequently cause errors in the picture, as small changes in image quality also imply unexpected effects on the diagnostic significance and ultimately have a negative impact on the patient (Longar and Fidler, 2004). Quality assurance (QA) includes all the planned and systematic measures that are necessary for the process to meet the requirements of the pre-set quality objectives. The goal of QA is to provide accurate diagnostic information while maintaining the radiation dose at an appropriately low level and to reduce costs (Mišić, et al., 2009). The technical characteristics of the device are controlled at daily, weekly and annual levels, and after each intervention (Kokić, 2009). Radiological technologists carry out daily and weekly measurements of the mechanical properties of the device, while physicists study the dosimetric characteristics. The relevance of medical images can be evaluated by different parameters after analysing the perceptual characteristics of the CT image (Cropp, et al., 2013) and some objective measurements of image quality (Liu, et al., 2011). The acceptability tests for image parameters are divided into two levels- level A and level B. In routine quality controls, deviations from the reference values are measured, which must remain within the prescribed limits (Båth, et al., 2005). The measured values must not exceed the permissible limits of deviation from the values specified in the specification of the acceptance test for the imaging system, which determines the composition of the phantoms, and the reference values and the permissible deviations from them (Šavora, 2013; Simčić, et al., 2011).

Optimage software

Optimage is an open source software that performs acceptance testing as part of QA of digital imaging systems in medicine. It was developed by the Center de Recherche Public Henri Tudor - SANTEC and partners (Center de Recherche Henri Tudor, 2009). Optimage enables the testing of the quality of medical images made with different image systems, within the limits of legal obligations (Sprenger, 2005). It helps to perform regular quality control tests (acceptance tests) in order to detect changes in the performance and operation of the imaging device. It also allows us to quickly assess the quality of images and can be included in each imaging system that is used by an institution (Junglen, 2007). Optimage can only evaluate test images made on an appropriate phantom. The test images are sent to the software, and then a program module that matches the system with which the image was taken must be selected. After that, a profile, in which the phantom information is stored, must be selected (Jahnen, 2008; Optimage homepage). Optimization is based on testing images obtained with a phantom

rather than those obtained on patients, which is an important advantage of the Optimage program (Båth, et al., 2005). Table 1 shows the modules and phantoms used for parameter measurements.

Table 1. Display and description of the modules and phantoms used for parameter measurements, which are included in the Optimage working framework (Jahnen et al., 2008)

Modules	**Test procedure**	**Type of phantom**	**Measured parameters**
CT level A	Basic measurements from the manufacturer's manual	Manufacturer phantom; Ø 16cm xacrylic plate "head phantom"	noise, SNR, uniformity, CT number for water and air
CT level B	Measurements from the CATPHAN manual	Phantom CATPHAN 500 (IBA, 2008)	noise, SNR, uniformity, pixel size, low contrast, resolution, slice thickness, table movement, CT numbers (air, acrylic, PTFE, LDPE)
Magnetic resonance imaging (MRI)	IPEM recommendations	Standard phantom	noise, SNR, uniformity
Classic X-ray machine	DIN 6868-13	phantom DIN 6868-13 (PTW, 2010)	noise, uniformity, low contrast, resolution, dynamic range, collimation
Mammography level A	European guidelines and PAS 1054	PAS 1054 phantom and PMMA blocks	noise, SNR, CNR, homogeneity, resolution, dynamic range, grayscale
Mammography level B	European guidelines and PAS 1054	PAS 1054 phantom with LCD24 implant	noise, SNR, CNR, homogeneity, resolution, dynamic range, grayscale, low contrast detail
Nuclear medicine	DIN EN 60789	Phantom is not required	Intrinsic non-uniformity

The results of an evaluation of a test image are shown in tables. They can also be stored in a database and then viewed in a graphical or statistical form. Quality control (QC) for each of the imaging systems is based on the prescribed values of test parameters that are in accordance with the European guidelines and stored in the profile of each module. The individual image parameters can be evaluated by the system at each module profile separately. When we want to analyse a new image in the program, the program tries to find the appropriate pre-created

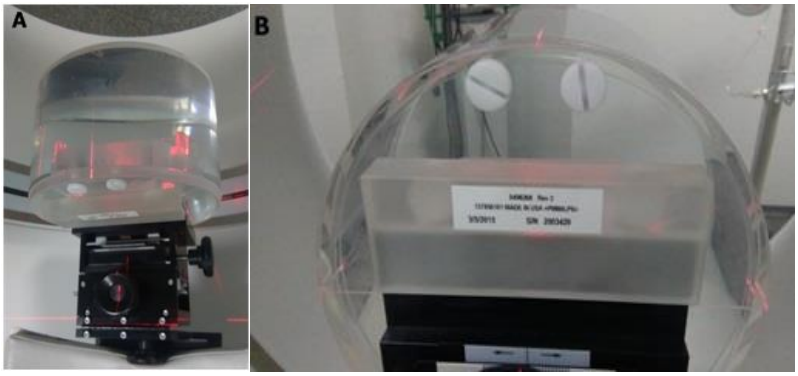
profile for it. If the process is successful, the program continues to test the image parameters. If the program does not find an appropriate profile, we need to create a new one or test another slice. If the tolerance limits are not exceeded, the user concludes that the system works perfectly. If the program detects an error while evaluating images, it warns the user. Because periodic quality controls are compulsory, the program automatically warns when the control should be repeated. The Optimage CT module implements the acceptance test for CT. It instructs the operator how to perform tests, defines the equipment needed for testing, standardizes QC procedures, and provides software for completing these tests.

Methods

The work deals with the the CT module in an Optimage working environment. All results focus on software implementation in clinical practice. A pilot study was carried out between August and September 2016, where the Optimage tool was tested in practice to monitor the quality control of the CT machine. Data from the pilot study were collected at the Radiology Department at the County Hospital Čakovec, Croatia within the General Electric Healthcare Optima CT540 (Picture 1) and the use of GE Healthcare Phantom (Picture 2).

Picture 1. GE Healthcare Optima CT540

The phantom was scanned by the standard QC protocol recommended by the manufacturer and acquired footage was used for evaluation in the Optimage software.

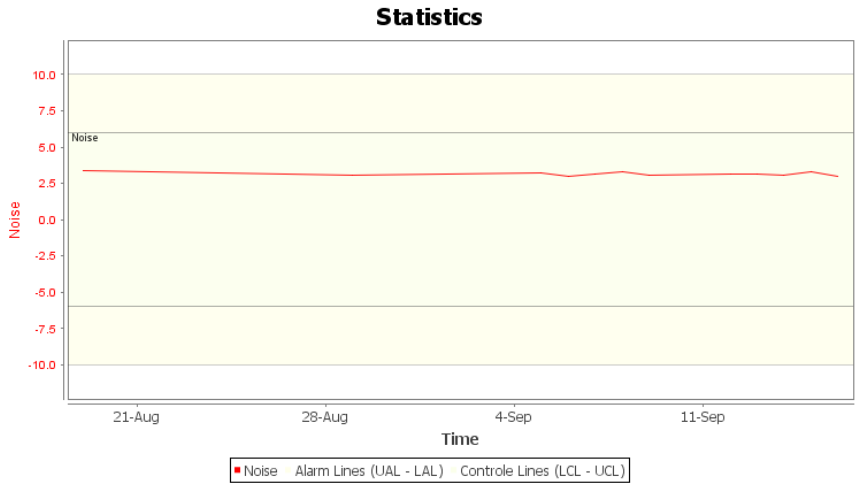


Picture 2. Figures A and B shows used GE Healthcare phantom

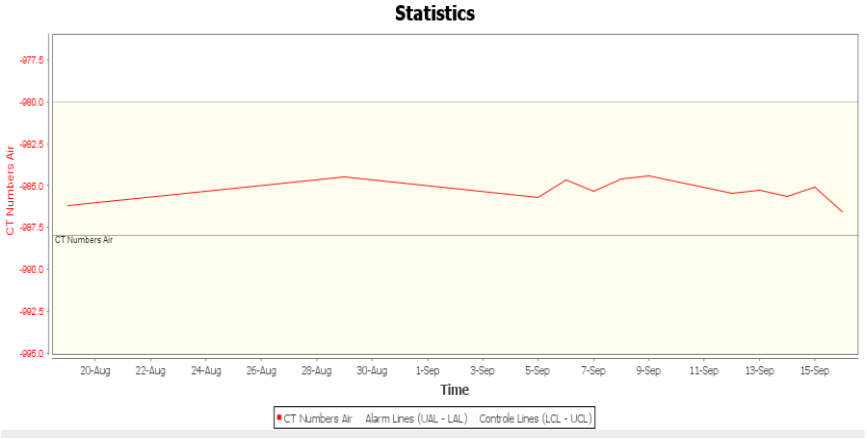
The phantom must be placed in the scan's centre. The daily check includes measurements of CT numbers for water, air, noise measurements and image homogeneity. We used the Optimage program to process the measurements. All additional information and data were obtained by observing and establishing a cause-effect association, and the results were processed quantitatively by a computer program, and more precisely with the statistical methods already included in the Optimage software tool. All results given by the Optimage software were obtained by the software for statistical analysis SPSS.

Results and discussion

The pilot study included images and measurements obtained from everyday GE Healthcare phantom scans. The measurements were analysed using the Optimage software. Testing included CT level A module in the operating environment of the software. We measured the standard deviation, noise, uniformity, pixel value and the value of CT numbers for air and water. All the results obtained were shown in the results table after completing the data processing. For a graphical display of data, it is first necessary to determine the time period for which we want to look at the results and select an appropriate profile that was used throughout the entire experiment. Then, we select the parameter that interests us and get the display, as in Picture 3.



Picture 3. Demonstration of the value of the noise during the period considered; all values are within the limits of the reference values (± 10 HU)



Picture 4. The graphical display of the values of CT air numbers during the considered period did not exceed the limit values of ± 20 HU.

With a statistical analysis, we wanted to determine how the CT quality parameters of the image are affected by the load on the CT apparatus and whether the parameters change with time. In addition, we also wanted to check whether the homogeneity parameters differed.

The impact of the device's load on the quality parameters of the CT image was measured using Pearson's correlation. The only statistically significant correlation between the number of investigations and uniformity is the one measured at the centre of the image ($r = 0.640$, $p = 0.043$). This correlation is positive, which signifies an increased degree of uniformity with respect to a large number of investigations. All other correlations are also positive, but statistically insignificant.

Time analysis of the parameters of the quality of the CT device was carried out with linear regression procedures, where we evaluated the trend of increasing or decreasing the value of the parameters of the quality of CT images with respect to the timing of measurements. Based on the results, we concluded that the trend of parameters with time is negative, which is reasonable, but it is not statistically significant. This means that the time statistically does not significantly affect (or worsen) the quality parameters of CT images.

The homogeneity of the images was analysed by the ANOVA variance analysis process, where we examined the basic hypothesis that CT numbers on different regions of interest are not statistically significantly different. By analysing the one-way ANOVA we found that the differences were not statistically significant (ANOVA, factor = ROI area, $F = 0.901$, $p = 0.472$). Statistical analysis was carried out with the SPSS program (IBM, 2016). The boundary of statistical characteristics was set at $p = 0.05$.

Conclusion

The QC of equipment used in radiology determines whether the individual characteristics of the system are in an optimal condition and whether they are essential for ensuring a high quality image. We must strive to maximize the quality of radiological examination. If there is a lot of

paperwork in our work with QC, then there is a greater chance of making a mistake. Greater quality is guaranteed if mistakes are smaller and less common. This is a solution available in our digital image QC. This way, we do not need to calculate the parameters manually, but the Optimage software with its statistical methods determines whether the permitted tolerance limits have been exceeded. With Optimage, we automate the QC procedures, which make them more predictable and include a lesser error option. That is why we believe that Optimage is an excellent contribution from the application point of view because it makes it much easier for the user to work with imaging devices and allows a constant level of an appropriate and high-quality image.

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TECHNOLOGIES VS. OLDER PEOPLE'S QUALITY OF LIFE

TEHNOLOGIJE VS. KVALITETA ŽIVLJENJA STAROSTNIKA

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Abstract

***Introduction**: By the end of the third decade of this century, Slovenia will have one of the oldest populations in the world. Due to the intensive aging trend it is necessary to study the quality of life of the elderly, particularly of the most vulnerable among them. The topic of this article belongs to a broader gerontology field, specifically to the field of studying the daily life of the elderly who have suffered a brain stroke. The aim of the study was to learn how the elderly experience illness in old age and how illness, specifically stroke, affects the daily life and how the use of technologies impacts the performance of daily activities. Research questions: What are the attitudes of the elderly stroke patients towards the daily use of technologies? How do the elderly stroke patients perceive the use of technologies with respect to the quality of their life?*

***Methods:** A qualitative study, namely, a qualitative content analysis, was performed. It was implemented through 6 in-depth interviews with the elderly stroke patients (average age 81 years) regarding their views on daily use of technology. The aim of the study was to explain the researched effect through identification and explanation of relationships among the key or selected categories, and to form a concept grounded theory.*

***Results:** The interviewees' attitudes towards the use of technologies in their everyday life are complex. Based on the analysis of qualitative data, technologies were classified into four groups: supporting mobility, helping maintain social networks, helping with personal hygiene and supporting household chores. Their attitudes towards the daily use of technologies are (in)directly influenced by three factors: their social networks, assistance provided by relatives and/or professionals and the ability to perform physical/mental tasks with respect to the level of their physical impairment.*

***Discussion**: The modern society is increasingly challenged with the fast-paced development of information and communication technology. In the context of technologies intended for the elderly, the development and upgrades are focused on ease of use, which is directly correlated with the ability to use them independently. The sense of independence in performing daily activities with or supported by the use of technologies is the strongest motivational element for improving the quality of life of the elderly who have suffered a stroke.*

Key words: *qualitative study, stroke , activity of daily living*

Izvleček

Uvod: *Slovenija bo imela do konca tretjega desetletja tega stoletja že eno najstarejših prebivalstev na svetu. Zaradi intenzivnih trendov staranja je potrebno proučevati kvaliteto življenja starostnikov, še posebej najbolj ranljivih med njimi.*

Namen študije je bil proučiti, kako starostniki doživljajo bolezen v starosti in kako bolezen, konkretneje možganska kap, vpliva na vsakodnevno življenje na eni strani in kako uporaba pripomočkov in tehnologij vpliva na funkcioniranje pri izvajanju vsakodnevnih aktivnost na drugi strani. Raziskovalni vprašanji: Kakšen odnos imajo starostniki po možganski kapi do vsakodnevne uporabe tehnologij? Kako starostniki po možganski kapi povezujejo uporabo tehnologij s kakovostjo svojega življenja?

Metoda: *Opravljena je bila kvalitativna študija, in sicer kvalitativna analiza vsebine. Izvedeno je bilo 6 poglobljenih intervjujev s starostniki (povprečne starosti 81 let), ki so doživeli možgansko kap v zvezi z njihovimi pogledi na vsakodnevno uporabo tehnologije. Raziskani učinek je bil interpretiran z uporabo identifikacije in razlaganja razmerij med ključnimi ali izbranimi kategorijami in nato oblikovana 'grounded theory'.*

Rezultati: *Odnosi anketirancev do uporabe tehnologij v vsakdanjem življenju so kompleksni. Na podlagi kvalitativne analize se razvrščajo tehnologije v štiri kategorije: pomoč pri mobilnosti, pomoč pri ohranjanju socialnih mreže, pomoč pri osebni higieni in pomoč pri gospodinjskih opravilih. Na odnos do vsakodnevne uporabe tehnologij (ne)neposredno vplivajo trije dejavniki: socialna mreža, pomoč, ki jo nudijo sorodniki in/ali strokovnjaki, ter sposobnost opravljanja telesnih / mentalnih aktivnosti v povezavi s stopnjo telesne okvare.*

Diskusija: *Sodobna družba je vse bolj pod vplivom hitrega razvoja informacijske in komunikacijske tehnologije. V povezavi s tehnologijami, namenjenimi starostnikom, se razvoj in nadgradnje osredotočajo na enostavnost uporabe neposredno povezani z njihovo samostojnostjo. Ugotovljeno je bilo, da je biti samostojen pri opravljanju vsakodnevnih aktivnosti, ki jih podpira uporaba tehnologij, najmočnejši motivacijski element za izboljšanje kakovosti življenja starostnikov, ki so doživeli možgansko kap.*

Ključne besede: 1 kvaliativna študija, 2 možganska kap, 3 vsakodnevne aktivnosti

Introduction

Cerebrovascular diseases affect 15 million people worldwide and are a leading cause of physical disabilities in people over 60 years of age. In Slovenia, every year, around 4,400 people suffer a stroke and 2,100 die as a result (Žvan and Zupan, 2012). Stroke patients often require social support, medical input and rehabilitation. Sudden onset of disability -which is often combined with attitudes involving ageism—creates many instances of stigmatization and requires a combination of treatment approaches to help survivors deal with the changed realities of their lives. Assistive devices and technologies (AD/T) have become an important part of the rehabilitation process. Novel technologies are bringing additional opportunities to patients as well as to health professionals, and can increase the level of patients' independence (Bird, et al., 2016).

The 21st century has been marked by population aging and quick development of AD/T. Since the nascence of humanity, people have been developing and using different tools and devices that would enable an easier and more efficient lifestyle. AD/T are tools, objects or technological devices that are used in everyday life and enable individuals to achieve their goals and perform daily activities they would otherwise not be able to perform well or perform at all. Zajec (2000, p. 24) cites Sigut: "Technologies were adopted by people without the knowledge of how that happened; they were owned by people, yet, they owned people even more; they were not a part of people, but without them, people would not be who they are." Every day we see the emergence of new digital devices that assist us with everyday tasks, work, communication and other essential functions. AD/T are an opportunity afforded to individuals of all ages who can accept, adapt and utilize them in order to achieve their goals and perform activities. Or, alternatively, they can decide not to do that. According to the World Health Organization (WHO), assistive devices constitute any equipment or product that can be commercially purchased or made to order and that maximizes, maintains or improves an individual's function and independence, and consequently, reduces impairment or disability. AD/T maintain and facilitate activity performance, therefore, improving well-being and preventing health deterioration (WHO, 2011).

Studies have shown that the purchase and use of new technologies in old age mainly depend on the costs and usefulness of a device. Furthermore, the influence technology has on the quality of life plays an essential role in the acquisition and acceptance of the AD/T.

1. Stroke and AD/T

In sociology, the discourse on stroke often contains the notion of a "ruined life" due to a chronic illness, which cerebrovascular accident is. Stroke discourse is most prevalent in the theory of "biographical disruptions". Bury (1982) defined biographical disruption as a critical situation in a life of a person affected by a chronic illness that changes a person's everyday life. A person becomes partially or completely unable to perform activities of daily living. The sudden onset of a chronic condition affects and controls the life of a person, which can cause insecurity and health deterioration, as well as it influences identity. Furthermore, people can experience doubts about their abilities and quality of life (Conrad, 2005).

After a stroke, older people use different AD/T to compensate for the loss of physical function (Mann, Hurren, Tomita, Charvat, 1995; Nasr, et al., 2016). Very little is known about the connection between AD/T use and the quality of life in older people after stroke. Moreover, research on the use of AD/T in later phases of rehabilitation when people are already living at home is scarce (Peek, et al., 2016; Pettersson, Appelros, Ahlstrom, 2009). To accept the long-term use of AD/T among seniors, the phenomenon needs to be explored also through the lenses of the adoption model of technologies (Luthar and Oblak-Črnič, 2009). This model includes the theory of diffusion of innovations, domestication (which is viewed as consumerism of technologies), and prosthetic materialism, the first of the three being the most prevalent (Freud, 2001, Luthar and Oblak-Črnič, 2009). AD/T include three functions: techno-function (usefulness), ideo-function (more abstract ideas and values that become materialized with AD/T), and socio-function (manifestation of social relationships) (Kristl, 2016). To consumers, technology is often presented as something that can significantly improve their quality of life.

The quality of life is a multidimensional and holistic construct that is evaluated on both the macro (social and objective) and the micro (individual and subjective) level. In social sciences, there are various approaches and models for evaluating and measuring the quality of life of the society, as well as of an individual.

The concept of quality of life is often used as a tool for subjective assessments and perceptions, in contrast to the material or lifestyle evaluations, which are measured objectively. What is important, however, is that both, the material aspects and quality of life, can be assessed with objective and external approaches as well as subjective perceptions. In literature, different concepts are often used interchangeably, for example, life conditions, standard of living, lifestyle, life situation, way of life and quality of life (Mollenkopf, Walker, 2007; Birren et al., 2014). Since the differences are not only terminological, but also theoretical, we first need to explain how these concepts are used and interpreted, and how the quality of life is defined. In a Scandinavian study on the standard of living (Brown and Brown, 2004), the researchers distinguished between (1) well-being and happiness, where well-being was linked to the needs and defined as a level of fulfilled needs, while happiness was linked to desires; and (2) material standard of living and quality of life. Standard of living was defined as the number of material and non-personal resources available to a person, while the quality of life was defined as the fulfilment of needs that can be met only in relation to other people (Brown and Brown, 2004).

Health care professionals (therapists and nurses) need to plan the whole process of AD/T acceptance. This includes assessing the older person, planning meaningful use of AD/T and determining the contribution from the perspective of quality of life (Yeung, et al., 2016).

The purpose of our study was to explore the use of AD/T among older people (specifically, older people who have had a stroke) using a specific, problem-based approach. We aimed to contribute to the contemporary discourse on aging in modern society. The population was chosen due to their vulnerability, which predisposes it to social stereotypes and myths connected with older people.

In this study, we were interested in the older stroke patients' perceptions of AD/T and who use it on a daily basis.

Methods

Our research approach included qualitative data analysis, using in-depth interviews. In the application of qualitative methodology, we followed Shank's definition of qualitative research who describes it as "a form of a systematic empiric enquiry about a meaning" (Shank, 2002). In this context, the systematic enquiry is understood as "(1) planned, (2) organized and (3) open or public" collection and analysis of the experiential material. In our study, the emphasis was on the principles of openness and transparency of the research process, which led to interpretation or "grounded theory" (GT). Furthermore, we ensured that the material was available for peer review by carefully documenting all the findings. The study was conducted in an environment that was considered the participants' 'natural' environment; which was their home environment and the environment where they performed their day-to-day activities.

Two research questions were developed

1. What are the attitudes of older people who had a stroke towards the daily use of assistive devices and technologies?
2. How do older people with stroke view the use of assistive devices and technologies with respect to the quality of their lives?

Four participants were recruited by using a purposeful sampling, and for two, the snowball sampling method was employed. For all the participants, the criteria for inclusion in the study were: (a) age between 75 and 85 years , (b) had a stroke, (c) able to communicate verbally, (d) daily use of assistive devices and technologies. The participants with similar characteristics were chosen , so that the sample could be as homogenous as possible in relation to the problem under study (Punch, 2009). The sample was considered relatively homogenous (all participants were old, had a stroke and were using assistive devices) and enabled an in-depth exploration of our research questions (Punch, 2009). We felt that after six interviews, theoretical saturation was reached, where no new or relevant themes, concepts, problems or insights seemed to be emerging from the data being collected (Bryman 2001). Being aware that total saturation is probably never achieved (Corbin and Strauss 2008), we decided for a guideline that established a level of saturation that was deemed acceptable and satisfactory and enabled us to answer our research questions.

Table 1. Participants' age, gender, time since stroke, and type of physical impairment

INTERVIEWEE	AGE	GENDER	YEARS SINCE CVA	IMPAIRMENT
INT 1	79	M	14	r- hemiplegia
INT 2	81	F	8	r-hemiplegia
INT 3	78	M	6	r-hemiplegia
INT 4	79	F	1	l-hemiparesis
INT 5	83	F	5	l-hemiparesis
INT 6	86	F	6	r-hemiparesis

In-depth, semi-structured interviews were used to collect data (Kvale, 1996). The interviews were conducted between December 2011 and March 2012 and took place at the participants' homes, which contributed to a secure and confidential atmosphere and encouraged participants to share 'their story' (Kvale, 1996). Although an interview guide was developed, the interviews resembled a flowing conversation and questions from the interview guide were adapted as deemed appropriate (Hermanns, 2004). We wanted to gain a comprehensive understanding of the older people's experiences with assistive devices and technologies, so we focused on different aspects of their lives. Interviews lasted between 90 and 180 minutes, were audio-recorded and transcribed verbatim.

The purpose of the qualitative analysis was to explore the phenomenon under study by explaining the relationship between the key categories and developing a grounded theory. In

grounded theory, the interpretation of data consists of three basic elements: concepts, categories and predispositions or themes (Mesec, 1998). When conducting the analysis, the following six steps were observed (Mesec, 1998): (1) organizing the material, (2) selection of themes and coding units, (3) open coding (which included (3a) ascribing concepts to empirical material, (3b) agglomeration of related concepts into categories and (3c) axial coding and analysis of the characteristics of concepts and categories), (4) choosing and defining relevant concepts and categories, (5) developing a paradigmatic model, (6) developing the final theoretical formulation or grounded theory. The interpretation of the gathered material and theoretical conceptualization were related to the study's specific context. Our grounded theory presents the experiences of older people who had had a stroke and use assistive devices and technologies to manage their daily lives.

Results and Discussion

The attitudes towards the use of AD/T in daily life can be complex. We need to consider the context, including the significant changes in daily life, which can be the consequence of stroke and manifest as a physical disability. The latter can partially or considerably reduce the older person's independence when performing activities of daily living. Gradually, this independence can increase, however, not always to the former level. Therefore, older people after stroke are "forced" to incorporate AD/T into their lives so that they can regain some of the physical independence.

From the perspective of facilitating and inhibiting factors, it is possible to recognize both a motivational element for the daily use of AD/T and the inhibiting factor that prevents the daily use of AD/T. The motivational element is characterized by improved independence in mobility and improved performance of everyday activities. On the other hand, (the feeling of) stigmatization that arises when using AD/T can act in an inhibitory way.

Based on the qualitative analysis, AD/T can be divided into four groups: (1) supporting mobility (wheelchairs, crutches, rollator frame, stimulator, shoes, foot orthosis, bed rail, handles and rails), (2) helping to maintain social networks and contacts (computer, mobile telephone, assistive device for card games), (3) helping with personal care, and (4) supporting household chores.

One of the interviewees described AD/T for **(1) mobility**, which he uses every day: '*They gave me a wheelchair and physiotherapy at the rehab centre...I wear orthopaedic shoes, the problem is my right leg; it's twisted, so I use shoes with an orthosis inside...I use the computer to communicate via e-mail, and Facebook a bit, too, but I don't have a profile. I surf the internet and also watch documentaries about travelling. I watch Planet Earth and re-live all those warm places, it's nice. I have an electric wheelchair for outdoors and a self-propelled for indoors, so I have two altogether (INT. 3)'.*

Another interviewee described similar experiences with the use of AD/T: '*Microwave...yes, I have been using it for a while already and I also use a handheld mixer. I try to keep up to date with my kitchen utensils...I also have a mobile phone and I send texts. And I'd also like to get the internet. My daughter said she'd buy a new computer, because hers is out of date. I'm*

interested in using the computer, I'd like to get used to the internet and mail. And without the mobile phone I'd be really cut off...A few years ago I'd drive around 20,000 kilometres per year, now I do around 10,000. I often drive to my summer house...' (INT.4).

The attitudes towards the daily use of AD/T in older people after stroke are intertwined and multi-faceted. They are directly or indirectly linked to different inter-related factors, which influence the level of acceptance. These factors are: (1) **social network**; the use of technology often increased participants' social network and level of contacts. Social network was found to be supportive and motivating with AD/T use. One participant described her new knowledge:

'I have a computer. And I communicate with my daughter via Skype. I use a computer a lot...I first thought it was scary. But then I just went for a course once and I learnt it' (INT.5).

However, there is also an experience of stigma when using AD/T. One of the participants explained how uncomfortable she felt using her wheelchair. Another, described her feelings when using a crutch: '*... (bypassers) are getting out of my way…they sometimes watch me…I don't feel comfortable.'' (INT.4). 'The shoe is ugly and heavy.' (INT.2). I'm very happy with the rollator frame. But it does take me out.' (INT.5). ' If I wear my hearing aid, the earwax builds up quicker. So, I don't like it so much.' (INT.6).*

The main reason the participants used AD/T was (1) **increased independence**, which contributed to a higher quality of life. Nonetheless, the use of AD/T was not sufficient for some who also required additional assistance from caregivers and relatives. The combination of the two enabled these participants to achieve maximal functioning. '*I have a crutch and an assistant to walk down to those blocks and there I'd sit down.' (INT.1).*

(2) Assistance of relatives and/or health professionals; assistance was sometimes required in order that AD/T could be utilized in an optimal way. Some barriers were removed by family members, friends or paid professionals. In contrast, interviewees had little influence over environmental barriers, which at times, made them feel incompetent. (3) The possibility to perform mental or physical activities despite their level of impairment. AD/T enabled participants to engage in both mental and physical activities. They all reported that AD/T were used several times a day, mostly because they wished to be more independent in their daily lives. '*If I succeeded in anything, it was because of the assistive devices…' (INT.2)*

Moreover, the use of information and communication technologies (ICT) did not only help improve social contacts, but it also assisted in cognitive performance of our participants. For example, they would play card games and search online for information that was analysed and selected for relevancy (e.g. looking for information on stem cells, alternative treatments for diabetes, reminiscing on world travels undertaken prior to stroke). For some interviewees, the use of ICT also served as escapism or prevention of boredom. This was more obvious when it came to watching television (reality shows and soap operas), using computer programs (playing computer games) and surfing the internet.

There was also some stress connected with the use of modern ICT, which involved digital illiteracy and unfamiliarity and suspicion about the safety of ICT. This was expressed in

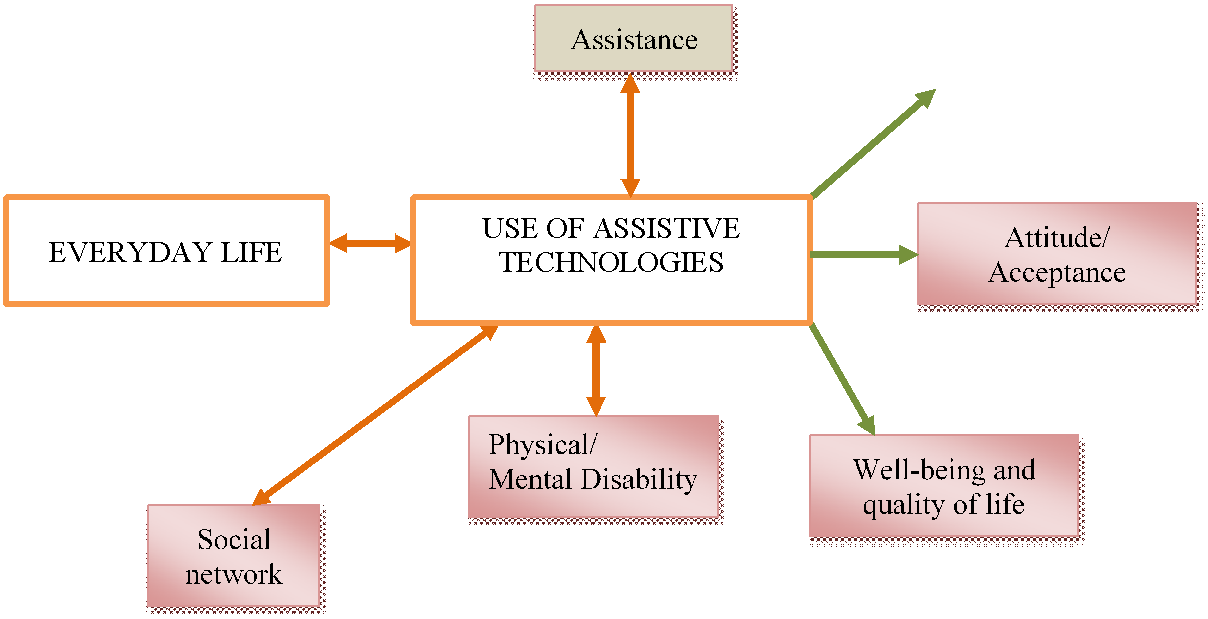
statements such as: '*I don't have a clue about the internet. I don't even know how to turn the computer on. I'm not interested in that at all.' (INT 1).* '*I don't really trust the computer, so I'm a bit careful. But I'm not afraid of the hackers, because I don't give them my e-mail address.' (INT. 3).* '*It bothers me if they call me when I'm asleep.' (INT 2). I don't like if strangers call me.' (INT. 4).*

The intensity of daily AD/T use was related to the level of physical disability and the ability to improve physical and mental performance. All participants reported that they used AD/T several times a day in order to improve their mobility. Most important for them was the ability to independently perform some of the basic activities of daily living, including using the toilet, personal care and household chores. '*I need help [from husband or a caregiver] to get from the bed to the wheelchair. They drive me to the kitchen to have breakfast. They drive me to the bathroom, so I can get myself ready. They drive me to the kitchen, so I can read.' (INT.2).' I have handles for personal care, so that the girls from the care agency can wash me.' (INT.3).*

Attitude or the form of acceptance of AD/T use was also directly linked to the perception of safety and trust in AD/T. AD/T replaced the physical function lost as a result of stroke. Interviewees reported: '*I know exactly how the orthosis will help me,* or *I must have a shoe, orthosis and a crutch to be able to walk. My orthosis is not good anymore, so I'm in a bit of a hurry.' (INT.1).*

An interesting observation was also that participants who had been using mobility devices and technologies for years (e.g. a wheelchair) still used action verbs to refer to their activities when they used these devices. For example, when using a wheelchair, they would use the verbs 'go' or 'walk' and not 'drive' or 'push'. It appeared that they accepted the mobility device as a substitute for the non-functioning part of themselves, and at times, they identified the device with the physical part that was affected by stroke. '*I like **going** to family celebration/…/ I **go** out, to the park, to the shops, I can **go** to the wash basin.' (INT.2) 'I **go** in the nature and enjoy it all/.../ I **go** to the bank alone/ then I **go** out again or to use the computer.'* (INT.3).

The use of AD/T was essential in the lives of all the participants. Devices helped in or enabled the performance of daily tasks. The factors that influenced the frequency of use included their social networks, assistance provided by relatives and/or professionals, and the ability to perform physical/mental tasks with respect to the level of their physical impairment.



Picture 1. Use of assistive devices and technologies in everyday life

Our study showed that the feeling of independence in activities of daily living was a strong motivational factor for the use of AD/T and influenced the older people's quality of life. We point out the importance of techno-function (usefulness), as well as ideo-function (the more abstract ideas and values that are materialized by AD/T) and socio-function (the manifestation of social relations). Therefore, we can confirm the theoretical underpinnings (Freud, 2001, Luthar and Oblak-Črnič, 2009) that describe the importance of all three functions, and enable that the needs of older people can be met. We also need to consider four elements that can influence the attitudes of older people towards the use of AD/T and their quality of life and which are related to positive growth after the onset of disability: (1) individual differences between older people, (2) social and environmental differences, (3) physical well-beingand (4) the related psychological well-being. The relationship between physical and psychological well-being of older people who had a stroke has been recognized in a simultaneous occurrence of physical disability (reduced mobility) and changes in cognitive function (cognitive intactness), which can result in a bipolar nature of a person’s general well-being following a stroke.

Many myths concerning the older population prevail around the world and in Slovenia. Ageism is a form of discrimination and implies that an individual is treated unfairly by reason of age. This can be manifested as a lack of trust in older people, which contributes to insufficient care, poor financial status and reduced quality of life of older people. Media featuring older people negatively (or not at all) further contributes to ageism. Mass media influence our opinions and

attitudes (Larson, Kubey, Coletti, 1989), turning ageism into a growing problem, not only for older people, but for society as a whole (Wilinska in Cedersund, 2010).

In the final part of the paper, it is important to note that in Slovenia, there is a lack of academic discourse about the treatment of older people in the media and about the influence of media on ageism. The representation of older people in the Slovenian media is a product of subjective perceptions. Two main forms of communication have been identified in Slovenian television programmes.On the one hand, there are commercials that focus on the health problems of older people. In line with this, they offer various devices (e.g. hearing aids) and products for symptom relief (e.g. Corega- glue for dental prosthesis, pain relief creams such as Nodol). On the other hand, there are programmes aimed at the general population that present the negative effects of aging on the future of the (national/global) economy and concerns related to the national budget and pension schemes. Old people in Slovenia are in danger to become a marginal group of the population that tends to be treated—similarly to foreigners—with a mixture of respect and contempt, which was described already in 1977 by Gutmann. There are, however, also some bright exceptions in the Slovenian media, for instance, interviews with recognized older people and radio shows such as Storž (Acorn), that present old age (through advice for active and healthy aging) in a positive light.

Conclusion

Experts, especially health care professionals, working with old people need to be aware of different myths and stereotypes related to old age. They need to dispel them as well as understand their origins. Furthermore, health care professionals need to possess the knowledge about AD/T, so that they can give appropriate advice to older people on devices that could improve activity performance and quality of life.

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QUALITY OF HEALTH INFORMATION ON HEART VALVE PROCEDURES ON THE INTERNET IN THE SLOVENIAN LANGUAGE

KAKOVOST ZDRAVSTVENIH INFORMACIJ V SLOVENSKEM JEZIKU NA INTERNETU O OPERACIJAH SRČNIH ZAKLOPK

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Abstract

***Introduction**: Proactive patients often search for health information on the Internet, but the information varies in quality. The purpose of the paper is to evaluate health information about heart valve surgical procedures in the Slovenian language that are accessible to patients on the internet. This surgical procedure is among the most common of all types of cardiac surgery.*

***Methods**: Search engines Google.si and Najdi.si were used in September 2017 to search for keywords "srčne zaklopke", ″srčne zaklopke″ and ″operacija″ or ″zamenjava″ or ″menjava″. For each of the eight searches, the first twenty search results were selected. The quality of health information on the internet site was analysed using the DISCERN instrument for assessing the quality of health information and the SPSS programme.*

***Results**: Of the selected 160 Internet sites, 19 Slovenian Internet sites with health information on heart valve surgical procedures were chosen in accordance with the inclusion and exclusion criteria and evaluated using the DISCERN instrument. The average overall DISCERN score for the websites was 37.9 (11.64 SD), out of a maximum of 75. The total of 63.1% of the site received a poor or very poor DISCERN score. The authors of the information on 52.6% of the internet sites were medical experts.*

***Discussion**: The quality of health information in Slovenian on heart valve surgical procedures that are available to patients is generally poor. Patients need high quality information to actively participate and make decisions about their health and treatments. Health professionals and institutions should be aware of the importance of improving the quality and quantity of health information accessible on the Internet.*

***Keywords**: internet, quality, health information, heart valve, surgical procedure*

Izvleček

***Uvod**: Aktivni pacienti pogosto iščejo zdravstvene informacije na internetu, a le-te so pogosto različne kakovosti. Namen prispevka je ocenjevanje pacientov dostopnih zdravstvenih informacij na internetu v slovenskem jeziku o operacijah srčnih zaklopk, ki so med najpogostejšimi operativnimi posegi na srcu.*

***Metode**: Na internetnih iskalnikih Google.si in Najdi.si je bilo izvedeno iskanje s ključnimi besedami ″srčne zaklopke″, ″srčne zaklopke″ in ″operacija″, ″zamenjava″ ali ″menjava″. Pri vsakem od osmih iskanj je bilo izbranih prvih dvajset rezultatov iskanja. Kakovost informacij na izbranih internetnih strani je bila analizirana z orodjem za ocenjevanje kakovosti zdravstvenih informacij DISCERN in programom SPSS.*

***Rezultati**: Izmed 160 izbranih internetnih strani je bilo po upoštevanju vključitvenih in izključitvenih kriterijev z orodjem DISCERN ocenjenih 19 slovenskih internetnih strani z zdravstvenimi informacijami o operacijah srčnih zaklopk. Povprečna skupna ocena informacij z DISCERN je bila 37,9 (11,64 SD), od maksimalno 75. 63,1 % strani je prejelo slabo ali zelo slabo DISCERN oceno. Na 52,6 % straneh so bili avtorji vsebine zdravstveni strokovnjaki.*

***Razprava**: V slovenskem jeziku je na internetu pacientom dostopnih malo kakovostnih informacij o operativnih posegih na srčnih zaklopkah. Pacienti potrebujejo kakovostne informacije za aktivno sodelovanje in odločanje o svojem zdravju in zdravljenju. Zdravstveni strokovnjaki in ustanove se morajo zavedati pomembnosti potrebe po izboljšavah kakovosti in količini na internetu dostopnih zdravstvenih informacij.*

***Ključne besede**: internet, kakovost, zdravstvene informacije*

Introduction

Searching the internet is a fast, convenient and useful way of searching for health information. Patients are increasingly turning to the Internet for health information on their disease and treatment options (Tarver, 2009; Fast, et al., 2012). The internet is a valuable information resource that can improve the patients' knowledge of their health problems (Craigie, et al., 2002). It has the potential for patient empowerment and encourages patient collaboration in their care (Connolly and Crosby, 2014). A critical element of a patient-centred health system where the patient is central and involves participant in the management of their health and healthcare is a patient using tools and technology that support management, sharing and using health information (Jimison, et al., 2008; Krist, et al., 2012). Patient's empowerment and shared decision-making are a practical and moral necessity (A. Townsend, et al., 2015). A well-informed patient is more likely to adhere to treatments and has better outcomes (Neelapala, et al., 2008). Ideally, patients take the responsibility to be informed about their state of health and forms of treatment available (Anderson and Funnell, 2011). Patients are motivated to seek and devote time and effort to finding information about specific disease and treatment and they search for health information on the internet to find information about their state of health and to reduce their anxiety (Neelapala, et al., 2008). Encouraging patients to take responsibility for their health can be difficult and even problematic as the information available is often incomplete, of questionable quality and even harmful (Van Deursen and Van Dijk, 2011). There are currently no obligatory regulatory standards for the ethical and clinical quality of the content on websites (Boyer, Dolamic and Falquet, 2015) and so the seekers of health information are forced to trust the information they find on the internet (Pandolfini, Clavenna and Bonati, 2009). There are also no standardized criteria for assessing health information on the internet (Devine, et al., 2016). Patients' interest in their health is becoming increasingly

important. Patient awareness is gaining in importance since patients themselves can do much to contribute to disease prevention and management and rehabilitation of chronic diseases (Štemberger Kolnik and Klemenc, 2010). Cardiovascular disease remains the most common cause of death in Europe and is responsible for 45% of all deaths, equivalent to 4 million deaths per year. Cardiovascular diseases account for 49% of all deaths among women and 40% of all deaths among men in Europe (N. Townsend, et al., 2015). Cardiovascular disease in Slovenia is the main cause of the disease and mortality, absenteeism and disability (Terbovc, et al., 2016). Despite the significant decline in the last few decades, cardiovascular disease remains the most common cause of death in Slovenia, accounting for 40% of deaths in 2015. Heart valve disease is one of the most common heart diseases (NIJZ, 2015) and is also one of the most common emergency conditions in patients with chronic non-infectious disease (Jus, 2016). Heart valve disease affects people of all ages. Heart valve procedures vary greatly, with heart valve replacements being the most common (Jug, 2014). Heart valve replacement surgery is mostly planned in advance and patients and their family members have time to search for health information on the internet. Content quality is evaluated on the basis of availability of responses to probable queries (Khazaal, et al., 2008), and its analysis is particularly relevant in languages spoken by a small number of people and when the content available on the Internet in their language is scarce (Singh, et al., 2007). The purpose of the paper is to evaluate health information about heart valve surgical procedures in Slovenian that are accessible to patients on the internet.

Methods

Search strategy and website selection

The search engines used were Google.com and Najdi.si in September 2017 to assess the quality of information about heart valve procedures. These two search engines were used because of their global and local popularity. Google is the most popular search engine for the purpose of searching for health information among layman and time-limited healthcare professionals (Tang and Ng, 2006; Niedzwiedzka, et al., 2014; Jamal, et al., 2015). When searching by using search engines, the results overlap, but each search engine emphasizes different types of content (Wang, et al., 2012). A list of commonly used search terms around the subject of heart valve replacement surgery was obtained from patient information leaflets. The keywords used were ″srčne zaklopke´, ″menjava srčne zaklopke″, ″operacija srčne zaklopke″, ″zamenjava srčne zaklopke″, variations of ″heart valve″, ″heart valve surgical procedure″ and ″heart valve replacement″ in Slovenian. A total of 160 web pages were chosen by searching the four key terms on the two search engines and then selecting the first twenty search results from each. The quality of health information on the internet site was analysed using the DISCERN instrument for assessing the quality of health information.

Evaluating quality of website information

The DISCERN instrument has been designed to help healthcare consumers and information providers evaluate the quality of written information about treatment options for a health problem (Charnock, et al., 1999). The DISCERN instrument has been tested for validity and

reliability (Breckons, et al., 2008). Although it is unlikely that any publication can meet all the information needs of a healthcare consumer, there are certain features that should be present if the publication is to be considered useful and appropriate for making decisions about treatment. DISCERN consists of 15 questions to help users of consumer health information systematically think about these issues. The 15 questions have to be answered on a scale of 1–5, where 1 means a definite 'No', 5 means a definite 'Yes', and ratings 2, 3, or 4 indicate that some of the elements asked by the question are present to a certain extent. The last question assesses the overall quality of the information presented but it is a generalized and potentially bias question so it was excluded from this research, as was in Fioretti et al. (2015). Eight questions (1–8) addressed the reliability, dependability, and trustworthiness of the written information available on the website, six questions (9–11 and 13–15) assessed the quality of the information on treatment choices (Charnock, et al., 1999). The maximum overall DISCERN score for each web page was 75 (15 questions maximum of 5 points each). For further analyses, the overall DISCERN scores were grouped into five categories, as was in Fioretti et al. (2015): very poor (15–26), poor (27–38), moderate (39–50), good (51–62), and excellent (63–75). The DISCERN scores for each of the websites were entered into SPSS and analysed.

Results

Search results

A total of 160 web pages were reviewed, 80 for each of the search engines (twenty results per four key search terms). The first 20 links reported by each search engine per keyword were evaluated for eligibility. Websites were included in the assessment if they were readily available on the internet, provided detailed information pertaining to treatment options concerning heart valves and were written in Slovenian. Websites were excluded from the final analysis if the information only mentioned heart valves, if the website was a discussion forum, if the website was only a list of website links or a for-profit website. After inclusion and exclusion criteria were applied, 96 websites remained. Removal of 77 duplicate websites left a total of 19 unique websites to assess the quality of health information (individual website URLs in Table 1).

Website quality

The overall mean DISCERN score for the 19 unique web pages that qualified was 37. 94 (11.64 SD, standard deviation), of a maximum score of 75 (table 1 for the 19 individual DISCERN scores). 10.5% (n=2) of the websites were of very poor quality (with scores below 26), 52.6% (n=10) of pages of poor quality (scores in the 27-38 score range), 21.0% (n=4) websites of fair quality (scores in the range 39-50), 10.5% (n=2) of websites were of good quality (51-62 range) and only one (5.3%) of excellent quality (Table 1).

Almost half of the web pages (42%; n=8) were lay newspaper articles online, one was a diploma thesis, 10.5% (n=2) were posted on an official medical organization web page, 10.5% (n=2) were written by doctors and posted on web pages of patient organizations, 31.6% (n=6) were scientific articles. More than half (n=11) were written by health professionals (9 by doctors and 2 by nurses) and 8 were written by journalists. There was no information about the

authorship or producers of the content presented on 4 websites and in 6 of the websites, sources of information were clearly stated. More than two thirds of the websites (68%; n=13) did not provide details about additional sources of support and information about heart valve procedures.

Table 1. URL addresses, site descriptions and DISCERN scores of 19 assessed websites

	URL address	**Site description**	**DISCERN score**
1	http://medicor.si/dobro_je_vedeti/nasveti/5/bolezni_srca_in_srcnih_zaklopk_ter_kako_jih_zdravimo/	Health organization	25
2	https://www.dnevnik.si/1042411406	Newspaper article	50
3	http://www.slovenskenovice.si/lifestyle/zdravje/dve-uri-odprtega-srca	Newspaper article	28
4	www.sicardio.org/Documents/solaeho/ruzic-umetne.pdf	Scientific paper	25
5	http://www.rtvslo.si/slovenija/endoskopska-zamenjava-srcne-zaklopke/11007	Newspaper article	35
6	http://www.primorske.si/Priloge/Zdravje/Srce-operira-skozi-majhen-rez-med-rebri.aspx	Newspaper article	35
7	http://www.drustvo-utrip.si/index.php/srcna-kirurgija-danes	Patient organization	34
8	http://www.littlechick-design.com/secondary/kok/strukturne_bolezni_srca/za_bolnike.php	Health organization	33
9	http://www.viva.si/Novice/6225/Perkutana-vstavitev-biolo%C5%A1ke-aortne-zaklopke	Newspaper article	31
10	https://www.dnevnik.si/1042410815/zdravje/1042410815	Newspaper article	28
11	http://www.maat.si/borut/Dnevnik%20%20Nova%20metoda%20operacije%20srca%20pri%20nas.htm	Newspaper article	36
12	https://www.dnevnik.si/1042736451/zdravje/bolezen-in-bolecina/zozitev-aortne-zaklopke-vstavili-tristo-zaklopk-brez-operacije	Newspaper article	29
13	http://kardiokirurgi.net/wp-content/uploads/2013/05/Zbornik-predavanj-Aortna-zaklopka1.pdf	Scientific paper	42
14	vestnik.szd.si/index.php/.../ article/download/223/115	Scientific paper	55
15	http://medrazgl.si/sodobni-vidiki-zdravljenja-stenoze-aortne-zaklopke-pri-starostnikih/	Scientific paper	68
16	http://zasrce.si/wp-content/uploads/uvoz/publikacije/341-zacsrcecseptemberclow.pdf	Patient organization	29
17	http://zbornica-zveza.si/sites/default/files/publication__attachments/vloga_medicinske _sestre_pri_pacientih_s_ srcno-zilnimi_in_rakastimi_obolenji.pdf	Scientific paper	45
18	http://kardiokirurgi.net/wp-content/uploads/2014/10/zbornik_MITRALNA-ZAKLOPKA_2012_final.pdf	Scientific paper	52
19	http://www.openscience.si/NaprednoIskanje.aspx?q=1:12:Nata%C5%A1a+Fridrih	Diploma thesis	42

The highest average score of DISCERN was obtained by question 5 regarding the time of the information production (4.42 out of 5). Question 12, regarding information of consequences if no treatment is administered, obtained the lowest average score (1.47 out of 5), 68.4% (n=13) websites made no reference to the subject. The questions with the lowest mean scores in the reliability domain were numbers 1 and 2, about the clarity of aims of the website content (1.53) and number 8 about uncertainties in knowledge regarding heart valve surgical procedures (1.89). More than a half of websites (52.6%; n=10) did not express uncertainty in knowledge regarding treatment options. Three websites (15.7%) did not have balanced and unbiased information. All websites to a certain extent described how the treatment is performed. There was no mention of any risks in the treatment in 16% (n=3) of websites and only one described risks explicitly. More than two thirds of websites (68.4%; n=13) did not mention the option of no treatment at all and only one website described the option of no treatment. One of the websites did not mention any other options for treatment and 26.3% (n=5) mentioned treatment options other than the one described on the website. In 63.1% (n=12) of websites, there was no mention of the effect on overall quality of life of patients after the treatment. Provision of support for shared decision-making about having a procedure was not highlighted on any website.

Discussion

The quality and completeness of web-based resources in Slovenian about heart valve procedures were poor to moderate. Similar to this research, previous studies using the DISCERN tool that focused on the quality of websites for general anaesthesia (Tallgren and Bäcklund, 2009), laryngeal cancer (Narwani, et al., 2016), lumbar fusion (Zhang, et al., 2016), stereotactic body radiation therapy for stage I lung cancer (Hopmans, et al., 2012), chronic pain (Kaicker, et al., 2010), metabolic syndrome (Joshi et al., 2013), 10 most common fractures (Memon, et al., 2016), social phobia (Khazaal, et al., 2008) and thyroid nodules (Barnes and Davies, 2015) reported that websites on the Internet are of moderate quality.

All involved in the healthcare system want a well-informed patient, better communication, patients' participation in the process, shared decision making, more responsibility and participation in all aspects of health (Lupianez-Villanueva, 2011), and yet shared decision making is not a priority in the content of the websites found in this research. Certain questions that are most important to the patient who wishes to be informed are seldom or never mentioned, including the quality of life after a heart valve replacement which is, in fact, a life-changing event. Although an equal number of websites content was written by healthcare professionals and journalists, the three websites with the highest DISCERN scores were scientific papers. Downing et al (2011) and Hopmans et al (2012) also reported the highest DISCERN scores in freely available scientific articles written for the scientific community but in the language that may not be understandable to all. Quality of a website does not ensure that the language is understandable to all. Patients may not be able to understand certain parts of the text. It is also very important to users to have access to health information in their own language (European Commission, 2014).

There are not a lot of websites with health information about treatment choices with heart valve surgery in Slovenian. A quarter (25%) of all websites is in English (Internet world stats, 2017). Knowledge of the English language seems to be crucial but most users search information only in their own language (Jamal, et al., 2015) and local inquiry does, in fact, have the better situational relevance of results (Lopes and Ribeiro, 2010). Lack of local information, low health literacy, a language barrier and lack of cultural diversity can contribute to the digital divide (Chang, et al., 2004; Christmann, 2005). Identifying high quality health information on the internet in a local language is crucial for users to use (Boyer, Dolamic and Falquet, 2015).

DISCERN is an effective tool for assessing the quality of treatment, but does not assess the scientific quality or accuracy of the evidence on which a publication is based (Castillo-Ortiz, et al., 2016). The scoring is subjective and can lead to experimenter bias (Narwani, et al., 2016) In practice, it has been found that DISCERN is rather complicated to use and is unknown to the public (Tallgren and Bäcklund, 2009). Use of such an instrument could be helpful for healthcare professionals or organizations to compile lists of links to higher quality websites (Griffiths and Christensen, 2005). This type of instrument may help to educate patients in terms of quality criteria, but leaving this responsibility to the patients may be inconvenient and unreliable (Fahy, et al., 2014)

Search engine algorithms have a major impact on the global dissemination of information (Allam, Schulz and Nakamoto, 2014). Internet search engines rank search results according to the popularity of the link or other algorithms, rather than relevance, which can cause that most desirable results are difficult to find (Eysenbach and Köhler, 2002). Producers and managers of credible, reliable online health information in local languages, such as hospital and government sites, should ensure that their sites are first to appear on search engines (Walsh, et al., 2012).

Modern healthcare requires independent and responsive activities by empowered and knowledgeable healthcare professionals (Gilmour, et al., 2016). Part of activities and knowledge should include knowing about the availability and quality of health information on the internet and ensuring that the patients are aware of which of the internet sources are trustworthy, useful and have legitimate information. Having access to high-quality information may help improve informed decision-making and overall patient satisfaction (Fast, et al., 2012). Pending improvement of online health information resources, healthcare professionals should warn patients about the problematic quality of health information on the internet and encourage them to be critical of what they have read on the Internet and discuss it with healthcare professionals.

Conclusion

The quality of health information in Slovenian on heart valve surgical procedures that are available to patients is poor and not many sources are readily available. Patients need quality information to actively participate in their health and healthcare and make decisions about their health and treatments. Health professionals and institutions should be aware of the importance of improving the quality and quantity of health information accessible on the Internet.

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USE OF VIDEO-GUIDED WORKOUTS AT A WORKPLACE

UPORABA VIDEO VADBE NA DELOVNEM MESTU

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Abstract

Introduction: *Many employers have realized that in order to minimize musculoskeletal injuries at a workplace, suitable equipment should be provided, and employees should be trained on ergonomics and prevention. In today's digital era, an active break consisting of a video-guided workout at a workplace could be a solution.*

Methods: *A systematic literature review search of PubMed and Cochrane Library databases was performed. With key terms 'video exercise at workplace', 'workout and workplace', 'video and exercise and workplace and health' 186 studies with a full text in the English language were identified. Only five original articles researching the use of video-guided workouts at different workplaces met the criteria.*

Results: *Intervention with a video-guided workout at the workplace showed a significantly improved quality of life for 97% of participants in the intervention group, 37% change in Oswestry Disability Index and 76% improvement in their clinical state. Performance-related musculoskeletal disorders frequency and severity were significantly reduced post intervention ($P < 0.01$). For three out of four exercises the normalized error score did not differ between groups at a 2-week follow up.*

Discussion: *Video-guided workouts at a workplace can be a simple and interesting way to help minimize work-related disorders and injuries and consequently improve the quality of life.*

Keywords: *video demonstration, work-related injuries, quality of life*

Izvleček

Uvod: *Veliko delodajalcev se zaveda, da je za zmanjševanje pojavljanja mišično-skeletnih poškodb, povezanih z delom, potrebno urediti delovno okolje, prirediti opremo in izobraziti zaposlene na področju ergonomije ter preventive. V dobi digitalizacije je ena od rešitev tudi aktivni odmor s pomočjo video prikaza vadbe na delovnem mestu.*

Metode: *Sistematski pregled literature je vključeval iskanje člankov v podatkovnih zbirkah PubMed in Cochrane Library s ključnimi besedami oz. besednimi zvezami "video exercise at work and health", "exercise at workplace", "exercise and health and work". Najdenih je bilo 172 zadetkov s polnim besedilom članka v angleškem jeziku. V meta sintezo je bilo vključenih 5 izvirnih znanstvenih člankov, ki so raziskovali uporabo video vadbe na različnih delovnih mestih.*

Rezultati: *Video prikaz vadbe na delovnih mestih v različnih delovnih okoljih uporabljajo nekatera podjetja v obliki aktivnih odmorov, ki jih izvajajo redno, vsak dan 10 minut, v obliki motivacije za uporabo stopnic namesto dvigala ali kot vzpodbudo k izboljšanju kvalitete življenja (in zmanjševanju bolečin ter poškodb). Video prikaz vadbe je povečal uporabo stopnic za 12,5% v primerjavi z ozaveščanjem preko plakatov, pripomogel k zmanjšanju pojavljanja bolečine v križu ter k izboljšanju kvalitete življenja.*
Razprava: *Video vadba na delovnem mestu lahko predstavlja enostavno in zabavno metodo za zmanjševanje težav in poškodb, povezanih z delom ter posledično vpliva na dvig kvalitete življenja.*

Ključne besede*: video prikaz, poškodbe pri delu, kvaliteta življenja*

Introduction

The digital era has brought a lot of new possibilities to people's everyday life. On one hand machines can perform some of the work that only humans could decades ago, while on the other, new technologies have also brought downsides. For example, a sedentary lifestyle presents one of the major problems and may lead to musculoskeletal disorders, which are most often work-related. According to the European Foundation for the Improvement of Living and Working Conditions (2017) almost 44.7% of workers in the EU suffer from back pain and more than 44.4% from muscle pain. As a result, their quality of life and work efficiency are decreased.

Owing to the complexity of the problem, many authors have suggested that multidisciplinary preventive interventions are highly significant and should be well designed and performed where most needed in a way that they are useful for as many workers as possible. Taieb-Maimon et al., (2012) divides ergonomic interventions at a workplace into individual, behavioral, technical and organisational. Individual ergonomic interventions target workers, informing them about good posture, significance of exercise, warm-up and relaxation. Even though they are referred to as individual, ergonomic interventions can be performed in groups with practical execution in front of a supervisor (for example a physical therapist, kinesiologist, ergonomist). Physical therapy has been introduced as a very effective treatment modality in other studies (Jay, et al., 2014, 2011) using elasting tubing, dumbbells, bodywight and similar equipment.

However, every intervention can also be quite costly for employers, so a lot of companies do not support hiring an additional physical therapist or kinesiologist to supervise the so-called active breaks at a workplace. In relation to this, using a computer as a tool to perform a workout with pre-recorded video-guided exercises with audible instructions might be the solution to the problem. This also allows for interventions such as comprehensive educational and exercise therapy rehabilitation programmes to be delivered at home (Kingston, et al., 2010). This approach is already commonly used in sports and rehabilitation medicine (Khalil, et al., 2012), as well as in teaching trainees and other sports trainers and instructors (Kingston, et al., 2010; Silverstein and Clark, 2004; Vandelanotte and Mummery, 2011).

The aims of this literature review were 2-fold:

1. To search for studies investigating the effects of using video-guided workouts at a workplace and compare their findings;
2. To find challenges and imperfections in these kinds of ergonomic interventions.

Methods

A systematic literature review of research databases MEDLINE and Cochrane Library was performed. Key terms 'video exercise at a workplace', 'workout and workplace', 'video and exercise and workplace and health' revealed 186 studies in English published since 2000. After reading titles and abstracts, 23 studies were taken into further reading. Only 12 research studies with randomized controlled trials with full texts were selected, however, seven of them did not meet the inclusion criteria: research needs to investigate the effect of video-guided workout compared to other strategies, while the participants must be employed adults. We excluded case studies and research performed on students, school children and retirees. As only five interrelated studies met the inclusion criteria, meta synthesis was performed.

Results

All studies included in this literature review used the video-guided workout as an object of their research. Three of them were performed on the same population (office workers), one among professional musicians (Chan, et al., 2014) and one among laboratory technicians and office workers (Jay, et al., 2014). Population size, intervention and results are summarized in Table 1.

The point of interest of the study performed by Jay, et al., (2014) was to evaluate the technical performance level of four different shoulder, arm, and hand specific exercises using elastic tubing. Participants were divided into an experimental group, which was given a set of written instructions and a video-guided workouts and a control group which exercised only under the supervision of an instructor. After two weeks of daily exercise (ten times) two physical therapists assessed the error score of technical exercise execution. Surprisingly, only one exercise (unilateral shoulder external rotation) showed significantly different scores, that is a higher normalized error score in the experimental group ($P = 0.002$).

Video-guided exercises were used among professional musicians performing regular physical activity prior to the trial (Chan, et al., 2014). The majority of participants ($n = 32$) took DVD-based exercise classes only and the other 18 took DVDs with face-to-face classes. Authors found a statistically significant effect on Performance-related musculoskeletal disorders frequency and severity (PRMD) scores post-intervention ($P < 0.01$), both reducing by more than one point on the visual analogue scale (VAS). Video-guided exercises were rated as the same (39% of musicians) or better (55%) in exercise instructions, demonstrations, precautions and warnings, and providing variations to exercises.

Table 1. Summary of studies included in literature review

Authors	Population	Intervention	Results
Jay, et al., 2014	38 laboratory technicians and office workers	Two groups: - Personal training and video workout - Video-based instruction group	For three out of four exercises, the normalized error score did not differ between groups at a 2-week follow up; for one exercise a significantly higher normalized error score was found (P = 0.002).
Chan, et al., 2014	50 professional musicians	Two groups: - DVD only group - DVD + face-to-face programme group (n = 18)	Performance-related musculoskeletal disorders frequency and severity were significantly reduced post intervention (P < 0.01).
Del Pozo-Cruz, et al., 2013b	100 office workers	Two groups: - Intervention group - Control group	For 97% of the intervention group, the quality of life improved significantly, Oswestry disability Index showed a 37% change, 76% improved their clinical state (StarT Back Screening Tool).
Del Pozo-Cruz, et al., 2013a	100 office workers	Two groups: - Intervention group - Control group	Significantly positive effects observed in the intervention group at a nine-month follow-up for the stage of change in the behavioural domain and questionnaire correlated with the improvement observed in Oswestry and VAS.
Del Pozo-Cruz, et al., 2012	100 office workers	Two groups: - Intervention group - Control group	Significantly positive effects on mean scores in the intervention group for risk chronicity (P < 0.019), correlation between functional disability, health-related quality of life was observed.

Three studies investigated the effects of web-based video intervention on the quality of life, specific lower back pain (LBP) outcomes, LBP-related exercise behaviour, and the overall risk status for chronicity compared to conventional treatment (Del Pozo-Cruz et al., 2013a, 2013b, 2012). Relative to the control group, the intervention group participants were more likely to exhibit improvements in functional disability (Oswestry Disability Index questionnaire clinical change, 85%, P = 0.001), risk of chronicity (VAS 73%, P < 0.001), clinical change (78%, P < 0.001), mobility (77%, P < 0.001), self-care (79%, P = 0.003), pain/discomfort (88%, P < 0.001) and anxiety/depression (84%, P < 0.001). Mean LBP severity scores showed significant positive effects in the intervention group (SBST 23% change, P = 0.019) and after 9 months of exercising 60.9% participants were SBST low-risk, compared to 27.9% participants in the control group (P < 0.01).

All the studies included in the literature review were clinical trials (Chan, et al., 2014) or randomized controlled trials (del Pozo-Cruz, et al., 2013a, 2013b, 2012; Jay, et al., 2014) as shown in Table 2. The shortest intervention was performed in the study conducted by Jay et al.,

(2014) with only 2 weeks of exercising compared to the longest intervention of Del Pozo-Cruz et al., (2013a, 2013b, 2012).

Table 2. Methodology of studies included in literature review

Authors	Study design	Intervention duration	Outcome measures
Jay, et al., 2014	Randomized controlled trial	2 weeks	Exercise error assessment: - Bilateral raise - Bilateral scapular retraction - Unilateral external shoulder rotation - Unilateral wrist extension
Chan, et al., 2014	Clinical trial	12 weeks	PRMD score, rating of perceived exertion, Likert item
Del Pozo-Cruz, et al., 2013b	Randomized controlled trial	9 months	Oswestry Disability Index, Keele STarT Back Screening Tool (SBST), Euro-quality of Life Questionnaire – 5 dimensions – 3 levels, Roland Morris Questionnaire
Del Pozo-Cruz, et al., 2013a	Randomized controlled trial	9 months	Oswestry Disability Index, Keele StarT Back Screening Tool (SBST), Euro-quality of Life Questionnaire – 5 dimensions – 3 levels, Roland Morris Questionnaire
Del Pozo-Cruz, et al., 2012	Randomized controlled trial	9 months	Oswestry Disability Index, Keele StarT Back Screening Tool (SBST), Euro-quality of Life Questionnaire – 5 dimensions – 3 levels, Roland Morris Questionnaire

All the studies revealed positive outcomes of using video-guided workouts. Participants reported on the benefits of DVDs on the strengthening of muscles, increase in the ease of movement and improvement of flexibility related to playing (Chan, et al., 2014), clinical improvements in the quality of life and selected lower back pain outcomes in the experimental group were showed (Del Pozo-Cruz, et al., 2013b), and exercise behaviour related to low back pain improved after the intervention period (Del Pozo-Cruz, et al., 2013a). Jay, et al., (2014) suggests that using a video-guided workout can be just as effective as having an instructor present when learning simple movement tasks.

Discussion

The aim of this literature review was to establish the (positive) outcomes of integrating video-guided workouts into ergonomic interventions among different workers at a workplace. There were few studies found related to the investigation of the use of pre-recorded videos, which is surprising since nowadays practically everyone (in developed countries) has a computer and access to the internet. Since company costs related to absenteeism are increasing, many employers have been seeking cost-effective interventions and video-recorded exercises as an alternative to employing a person to supervise employees' physical activity could be one of them.

On the other hand, one possible advantage of employing a person rather than use a video guided workout could be the anticipated risk of an increase in errors made during exercise where there is no instructor to provide appropriate corrections. Despite their hypothesis of a higher error score in the intervention group Jay, et al., (2014) discovered that only in one of the four exercises that could be confirmed. This suggests that using pre-recorded exercises on video can be just as effective as having an instructor (physical therapist, kinesiologist etc.) present.

Participants in the study conducted by Chan, et al., (2014) rated the video instructions as the same or even better in all the measured categories (instructions, demonstrations, precautions and warnings, providing alternatives and variations to exercises, motivation, convenience), which demonstrates that similar interventions can be well accepted among workers and commonly used not only in a workplace, but also at home. Video instructions appeared to be successful in terms of compliance and safety despite the participants working out without supervision.

Workers often complain that the reason for avoiding physical activity at work is their lack of time. Del Pozo-Cruz, et al., (2013a, 2013b, 2012) showed that even 11 minutes of video-guided workout and a demonstration of good posture can have significant results in the quality of life and decrease the risk of chronic lower back pain.

Lectures, computer presentations, brochures and posters on physical activity and good posture remain a common choice of ergonomic interventions in many companies (Aghilinejad, et al., 2015; Shuai, et al., 2014) which were shown to be less effective than a supervised group or individual workouts (Aghilinejad, et al., 2015; Shuai, et al., 2014; Sundstrup, et al., 2014; Taieb-Maimon, et al., 2012). A suitable substitution for a supervisor could be a pre-recorded video-guided workout, which showed very beneficial results.

Due to a lack of research on investigating the effects of video-guided workouts compared to other interventions applied at various workplaces, further research is warranted to deliver more accurate results and address possible negative effects such intervention could bring.

Conclusion

The use of a video-guided workout proved to have many beneficial results on the health of workers and represents a cost-effective alternative to face-to-face exercising at a workplace.

Due to a lack of research sources, studies on the effects of using a video-guided workout at a workplace further investigations need to be done.

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THE INFLUENCE OF MODERN DIGITAL INFORMATION SOURCES ON RESPONSIVENESS AND PARTICIPATION IN CANCER SCREENING TESTS

VPLIV MODERNIH DIGITALNIH VIROV INFORMACIJ NA ODZIVNOST IN UDELEŽBO V PRESEJALNIH TESTIH ZA RAKAVA OBOLENJA

Vesna BOŽIČEK

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Abstract:

Introduction: *Cancer diseases are becoming an increasing public health concern. National screening programmes SVIT, ZORA, DORA and opportunistic breast screening in OE ZZZS Celje (Regional Office of the Health Insurance Institute of Slovenia, Celje), enable discovery of precancerous changes and early-stage cancer. The purpose of this article is to find out how the use of modern digital sources influences the responsiveness and participation in screening tests for cancer SVIT and ZORA and the opportunistic breast cancer screening in the administrative office Šmarje pri Jelšah.*

Methods: *The descriptive method of survey was carried out among the inhabitants of the Kozjansko region, who were invited to screening tests in October 2017.*

Results: *The results are presented on the bases of gender, age and the individual national screening test programme. Participation in these programmes: SVIT 69 % men, 62 % women, ZORA in the 20-49 age group 66 % women and in the 50-64 age group 41 % women, opportunistic breast cancer screening 31 % women. 30 % of men and 39 % women searched for additional information about the program SVIT on the internet and the percentages of those who searched about the program ZORA were: younger group of women 73 %, older group of women 40 % and opportunistic breast cancer screening 30% women. The internet influenced the choice for participation in the SVIT programme in 33 % men and 52 % women; in the ZORA program 43 % younger women and 30% older women, and for opportunistic breast cancer screening, 63 % women.*

Discussion: *The participation in the national screening program for cancer diseases has an influence on every individual and the community. Early detection of signs of diseases enables early treatment, rehabilitation and integration of the individual into an active lifestyle. The role of the internet grows in importance and it contributes to e-literacy. But it should not replace the genuine communication between the invitee and the health professional. This is very important for participation.*

Keywords: *modern digital information sources, screening tests for cancer, health information*

Izvleček

Uvod: *Rakava obolenja postajajo vse večji javnozdravstveni problem. Državni presejalni programi SVIT, ZORA, DORA in v OE ZZZS Celje oportunistično presejanje za raka dojke, omogočajo odkrivati predrakave spremembe in raka v začetni fazi. Namen prispevka je ugotoviti, kako se uporaba modernih digitalnih virov informacij odraža na odzivnost in udeležbo na presejalnih programih za rakava obolenja SVIT in ZORA ter na oportunistično presejanje za raka dojke v UE Šmarje pri Jelšah.*

Metode: *Deskriptivna metoda dela je bila izvedena s pomočjo anketnega vprašalnika med prebivalci Kozjanskega, vabljenimi na posamezne presejalne programe v oktobru 2017.*

Rezultati: *Rezultati so predstavljeni na podlagi spola, starosti in posameznega državnega presejalnega programa. V programe se je odzvalo: SVIT 69 % moških, 62 % žensk, ZORA v starosti 20 do 49 let 66 % žensk, 50 do 64 let 41 % žensk, oportunističnega presejanja za raka dojk, 31 % žensk. Preko interneta so dodatne informacije o programu SVIT moški iskali v 30 %, ženske v 39 %, programu ZORA ženske v mlajši skupini v 73 %, v starejši skupini v 40 %, o oportunističnem presejanju za raka dojk pa v 30 %. Internet je imel vpliv na odločitev za sodelovanje v programu SVIT v 33 % moških, 52 % žensk, v programu ZORA v 43% mlajših in 30 % starejših žensk, za oportunistično presejanje pa v 63%.*

Razprava: *Udeležba na državnih presejalnih programih za rakava obolenja ima vpliv na posameznika in skupnost. Zgodnje odkritje znakov bolezni omogoča čimprejšnje zdravljenje, rehabilitacijo in vključevanje posameznika v aktivno življenje. Vloga modernih digitalnih virov informacij je vse pomembnejša, prispeva k e-pismenosti, vendar ne sme nadomestiti pristne komunikacije med vabljenim in zdravstvenim delavcem, kar je ključ do udeležbe.*

Ključne besede: *moderni digitalni viri informacij, presejalni testi za rakava obolenja, zdravstvene informacije*

Introduction

In recent years, information about peoples´ health has become far accessible, aided by rapidly expanding modern digital information source (hereinafter internet) (Diviani, et al., 2015). The use of information and communication technology plays an important role in health services (Sedlar Kobe, Milavec Kapun, 2016). This is because of the increasing use of internet in various areas of everyday life. Users of health services represent a challenge, because they demand an active participation in the evaluation of sometimes unverified information (Diviani, et al., 2015). Most participants don't check reference sources of information while they are searching the internet (Černe, Petek, 2016). When searching for health information e-literacy has the most important role in the field of health. It has been identified as a cognitive and social skill, which determines motivation and the ability of individuals to find information, and to understand and use the information to stay healthy (Diviani, et al., 2015). The use of the internet improves dissemination of information, delivery of health services and results, in relation to health care. This potential has an important role in the field of health care. There are also many options for the promotion of health (Sedlar Kobe, Milavec Kapun, 2016). (Iverson, et al., 2008) refer to certain research result, stating, that 58 % respondents used health information found on the

internet. About half (55 %) reported, that they had changed the way of thinking about their health. Women, young adults, educated people and people with better social and economic status search for information about their health more often. The level of e-health literacy affects the search of cancer information. But there is no important connection between the e-health literacy and participation in screening tests for cancer (Park, et al., 2014). Moreover, people with poor e-health literacy skills less commonly participate in screening programmes for cancer (Meppelink, et al., 2015).

Cancer mortality in Slovenia is the highest amongst the EU States. More than 13,000 Slovenes are diagnosed with cancer annually. Cancer is more prevalent in the older generation (only a third of sick people are younger than 65). The Slovene population is aging, so it is expected that the burden of disease will be much higher in coming years. Systematic and long term reduction of the disease is possible only by implementing the complete cancer strategy in Slovenia. The state programme for cancer control (hereinafter DPOR) is a programme of activities, tasks and measures that are necessary for completely controlling cancer in Slovenia. The main goal of the European Partnership for Action Against Cancer is to reduce new cancer cases by 15 % in EU Member States by the year 2020 (Government of the Republic of Slovenia, 2017). Cancer is a common disease, which can be treated successfully. Risk factors in the development of cancer can also be reduced. The early detection of disease is very important, because it can be treated successfully (Vračko, Govc, 2017). The screening tests are carried out to diagnose cancer threats. The basic concept is an early detection of risk factors and diseases. This is useful for clinic or public health outcome (Bulc, Vračko, 2017). We can prevent 40 percent of cancer with the primary prevention and control of risks factors. Secondary prevention is an early detection of disease. The healing of cancer is more successful, if it diagnosed at an early stage.

The DORA programme is a Slovenian population-based breast cancer screening programme, which is organized by the Slovene Institute of Oncology in cooperation with the Ministry of Health and The Health Insurance Institute of Slovenia. DORA strictly follows European guidelines for quality assurance in breast cancer screening. This programme invites women aged 50 to 69 years to mammographic screening every two years. The aim the programme is to reduce the breast cancer mortality of examined women by 25-30 %. The aim until the year 2020 is a 70 percent average participation in the DORA programme in every regional office of the Health Insurance Institute of Slovenia. The mortality of breast cancer can be reduced in ten years after coverage of the entire population. ZORA is a national programme for discovering the precancerous changes of cervical cancer. Its aim is to achieve a medical check-up of 73-75 % women every three years until the end of year 2021 and to maintain an incidence of between 100 and 120 new cases of cervical cancer annually. All the women aged 20 to 64 years who were not examined with a cervical smear in the last three years, get an invitation for a check-up from ZORA or their gynaecologist. SVIT is a national programme of screening and discovering precancerous changes of colorectal cancer. It is organized by the National Institute of Public Health in cooperation with the Ministry of Health and Regional Office of the Health Insurance Institute of Slovenia. Its aim is to increase participation in the SVIT programme to 65 % in all target groups by the end of year 2019. The target population is in the 50-74 age group (The Government of Slovenia, 2017). It depends on the conversation with the family

doctor if the individual will respond to an invitation as researchers (Vračko, Govc Eržen, 2017) say that only the doctor can encourage participation in the organized screening tests. According to the information of the National Institute of Public Health and Center for Prevention Program and Health Care (2017) responsiveness of the invited people in the SVIT programme on a state level is 62.42 %, the responsiveness of men being 57.24 %, and the responsiveness of women is 67.33 %. In administrative office Šmarje pri Jelšah, the average responsiveness is 56.61 % (53.40 % of men and 59.96 % of women). It signals a lower percent than the state average. In the ZORA programme almost 72 % (71.9 %) of women were examined in the period from 1.7.2013 to 30.6.2016. As in all periods from the beginning of the activity of the programme, the visit was also lately more than 70 % in the 20-49 age group. The visit is lower in the 50-64 age group, although it is rising slowly in the older group (Primic Žakelj, et al., 2017). In administrative office Šmarje pri Jelšah the visit rate is 72,9 % (Oncology Institute, 2017).

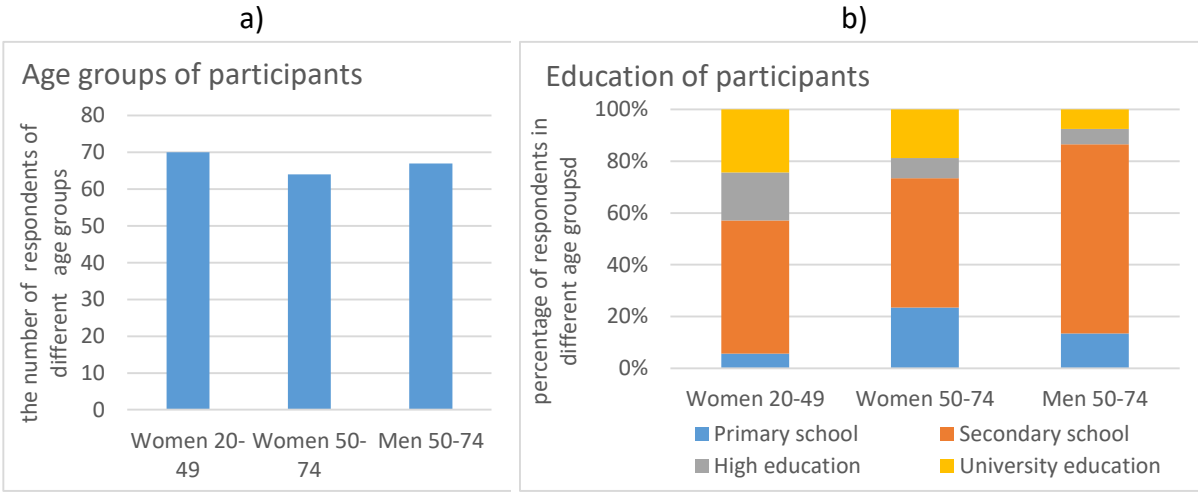
The DORA programme doesn't work in all Slovenia areas and screening hasn't been organized, as in some other European countries. Opportunistic breast screening is organized in the way that women come to the breast cancer centres, when the doctor recommends or they come voluntarily. In some areas women are invited to the examination. In such a way the screening was organized in regional office Šmarje pri Jelšah. The DORA programme has a goal to expand the programme to all regional offices of ZZZS (The Health Insurance Institute of Slovenia). In the survey the influence of internet on responsiveness and participation in screening programmes SVIT, ZORA and opportunistic breast cancer screening was researched.

Methods

The quantitative approach and descriptive methods were used for this research. Primary and secondary sources were collected, analysed and synthesized for the empiric part. The primary sources were obtained with two questionnaires. The secondary sources were collected with through academic literature. The keywords used were: modern digital information sources, screening tests for cancer, health information. The survey took place in October 2017. The questionnaires were delivered to coincidental inhabitants of the Kozjansko region. There were eleven questions in each questionnaire, including demographic data. 201 participants, 67 males and 134 females participated. The first questionnaire about the influence of internet and participation in programme SVIT was answered by men aged 50 to74. The second questionnaire about the influence of internet and participation in the ZORA programme was answered by 70 women aged 20 to 49. The questionnaire about the responsiveness of and participation in ZORA, the opportunistic screening test for breast cancer and the SVIT programme was answered by 64 women aged 50 to 74 years.

Results

201 adults responded to the survey. They were divided into different age groups (Picture 1a), that determine in which programme the individual was invited: SVIT, ZORA and opportunistic breast cancer screening. The respondents represent the population with different levels of education. Secondary school education (73 % and 50 %) is the most common among men and women. Picture 1b shows more accurate education structure of respondents.

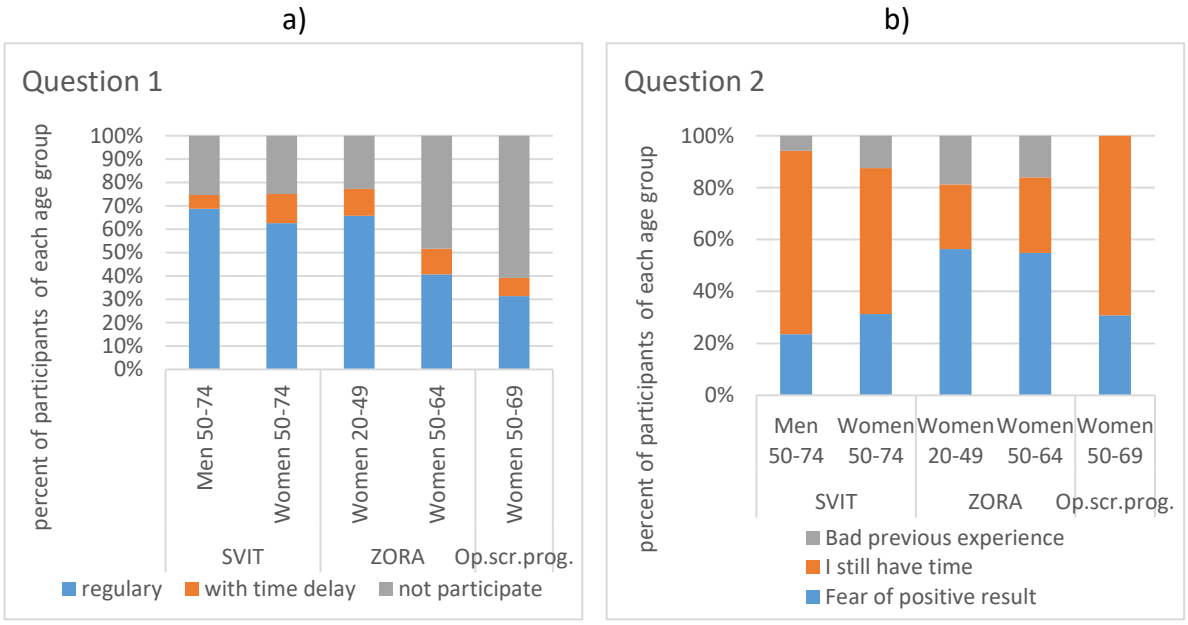


Picture 1. Presentation of a) share of participants in age groups and b) education of participants

Below, the analysis of answers of respondents is presented.

Question 1*: How do the participants (inhabitants of administrative office Šmarje pri Jelšah) participate in state screening tests for cancer diseases ZORA, SVIT and opportunistic breast cancer screening? (Picture 2a)*

Question 2: *Which are the reasons for not participating in state screening tests for cancer diseases ZORA, SVIT and opportunistic breast cancer screening? (Picture 2b)*



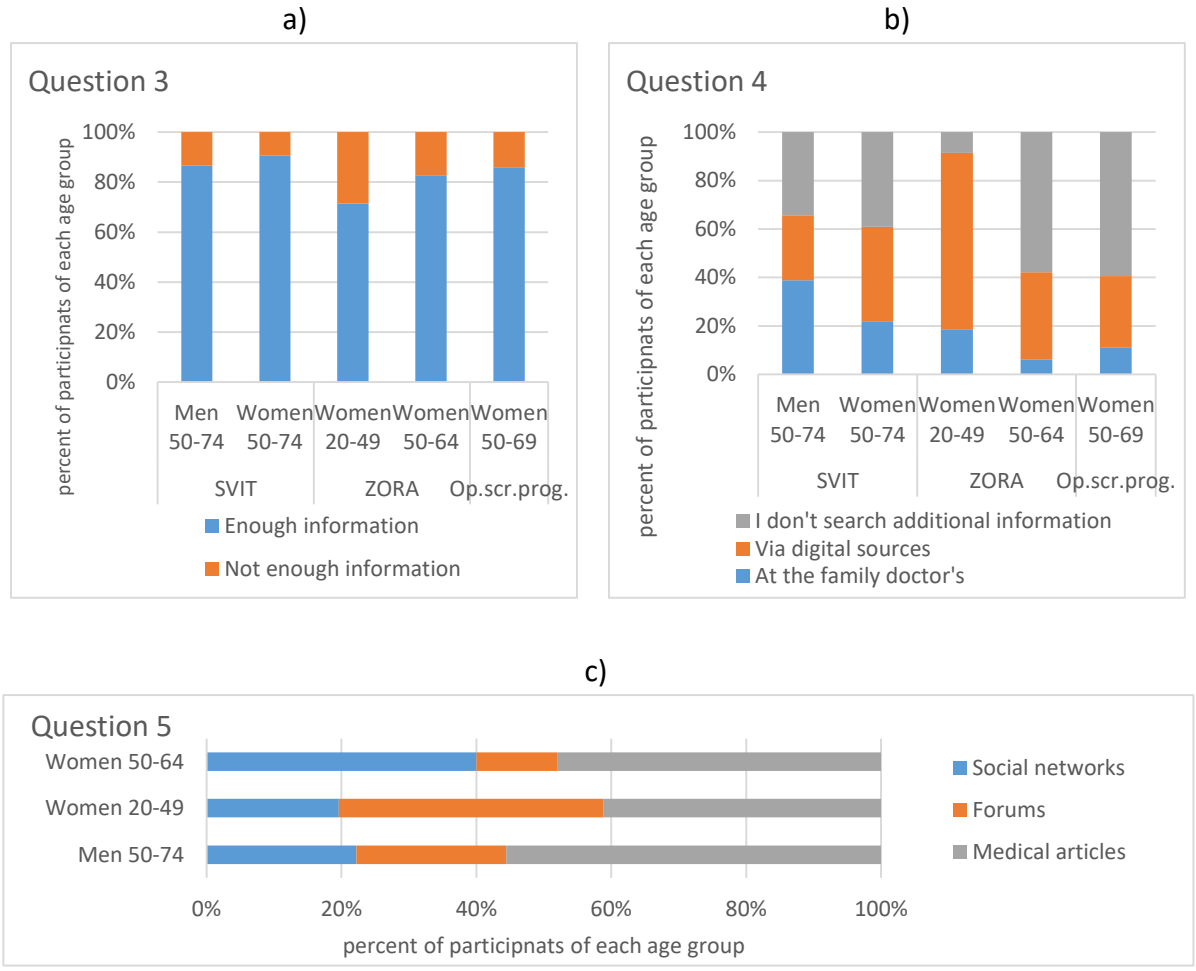
Picture 2. Analysis of answers about the participation in national screening tests

Next questions are about the public information of state screening programs. Sufficient information, the need of searching for additional information and sources of information are crucial for the starting point of these three questions.

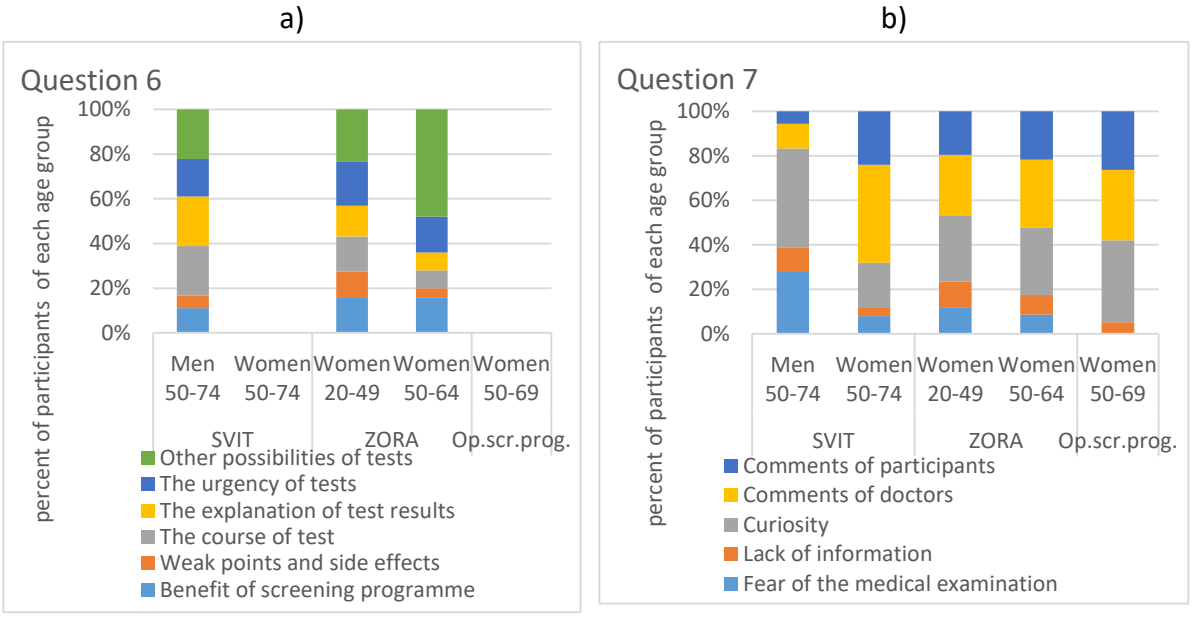
Question 3: *Do participants of screening tests get enough information when they receive an invitation? (Picture 3a)*
Question 4: *Do the invited people search for additional information at the family doctor's or on the internet before the physical examination in screening tests? (Picture 3b)*
Question 5: *Which source of modern digital information is being used most often? (Picture 3c)*

Information about screening programmes offer many views. Some information offer them more often, the others rarely. Analyses of question 6 shows, what kind of information the participants got.

Question 6: *Which are the most common answers with the screening programmes? (Picture 4a)*
Question 7: *What was the reason for searching for additional information through the modern digital sources of information? (Picture 4b)*



Picture 3. Analysis of answers about sufficient public information about a) screening programmes, b) searching for additional information and c) sources of information

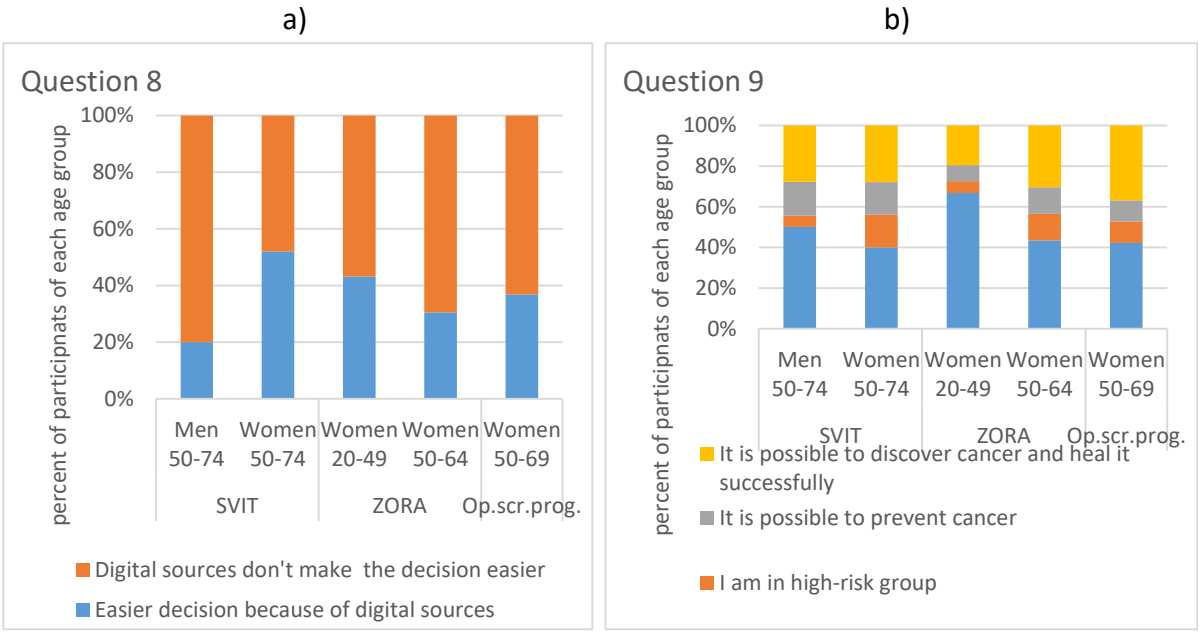


Picture 4. Analysis of answers to questions about most common a) answers associated with screening programmes and b) reasons for searching for additional information via digital sources

In the next questions the participants had to define how the influence of internet information affected their decision to participate in screening programmes and which information was crucial for their choice.

Question 8: *Does information from modern digital sources make the choice for participation in screening programme easier? (Picture 5a)*

Question 9: *Which information from modern digital sources had an influence on the decision to participate in the screening programmes? (Picture 5b)*



Picture 5. Analysis of answers to the questions about the influence of information about the decision to participate in screening programmes

Discussion

The results of the survey show, that three thirds of invited men and women responded to the SVIT programme (Picture 2a). The information of the National Institute of Public Health (NIJZ) show, that only a few more than half of all invited responded. The responsiveness of women is higher than the responsiveness of men. We assume this difference is because of the respondents' higher level of education and good e-literacy skills (Picture 1b). People with poor e-literacy skills don't respond to screening cancer programmes as often. In the ZORA programme, three quarters of women in the 20-49 age-group participated, in the 50-74 age-group only one half of survey participants participated (Picture 2a). Less than half of the respondents took part in the opportunistic breast cancer screening (Picture 2a). The reason men and women most often mentioned for not participating in the SVIT programme, is that they still have time to take part in this programme, so they delay their visit to a later period (Picture 2b). In more than half of cases the younger and older women state the fear of a positive result as one of the reasons for not participating in the ZORA programme. Almost half of the women state the same reason in the opportunistic breast screening programme (Picture 2b). Most men and women are satisfied with information about the SVIT programme, which they get by invitation (Picture 3a). Information about the ZORA programme satisfy the old age group in four-fifths of responses, but in the younger group only two-thirds of the people are satisfied with information about the programme (Picture 3a). Most of women are satisfied with information they receive about the opportunistic breast cancer programme (Picture 3a). More men than women search for information about the SVIT programme at the family doctor's. More women than men search for information on the internet (Picture 3b).

Both groups use the internet to get additional information about the ZORA programme, in the younger group more than three-quarters (Picture 3b). A small number of women searched for additional information about opportunistic breast cancer screening at their family doctor's. And only one third of women searched for information on the internet (Picture 3b). A higher percent of women than men searched for information about prevention programmes. More men than women searched for information in professional literature (Picture 3c). Men search on the internet mostly for answers about the course of tests in the SVIT programme, the explanation of test results and other possible tests (Picture 4a). Women in the age group 50 years and more search for answers about the possibility of other tests for early discovery of cancer. Younger women search also for the answers about the course of the test and about weak points and side effects of tests (Picture 4a). Men and women rarely think about weak points and side effects of tests (Picture 4b).

Almost half of male respondents search for information on the internet because they are curious. Women are more interested in doctors' comments (Picture 4b). Middle-aged adults and old people stated that they don't use technology and internet so often, because they don't trust them (Kvas et al., 2016). The research shows, that most people search for doctors' comments and trust them more often.

For half of the female participants, the decision to participate in the SVIT programme was easier because of the information they got online (Picture 5a). Under two-fifths determined that

information found on the internet made the decision easier to participate in the ZORA programme and the opportunist breast cancer screening (Picture 5a). The information on the internet influenced the men's decision only in one-fifth of cases (Picture 5a). (Park, et al., 2014) state, that there was no important connection between the e-health literacy and cancer screening programmes. But e-cancer literacy showed a statistically important influence on the cancer screening experience (Baeg, Park, 2015). The necessity of taking care of one´s health is information sourced via internet, which influenced men's and women's decisions, whether to participate in screening tests or not (Picture 5b).

Conclusion

The report shows results of the first survey about the influence of the internet on responsiveness to programmes ZORA, DORA and opportunistic breast cancer screening in administrative office Šmarje pri Jelšah. The use of the internet helps the health progress of the inhabitants, but I think that people still need an enecouraging word from their healthcare worker. They need more health education and more publications about the importance of screening tests, awareness of healthy breasts, gynaecological health and especially intestinal health, where the participation is low. Everything depends on the individual and his choice.

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THE INFLUENCE OF MODERN DIGITAL INFORMATION SOURCES ON PARENTS' DECISION ON CHILD VACCINATION: PRO ET CONTRA

VPLIV MODERNIH DIGITALNIH VIROV INFORMACIJ NA ODLOČITEV STARŠEV ZA ALI PROTI CEPLJENJU OTROK

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Abstract

Introduction: *The use of modern digital sources of information provides parents with positive and negative information on vaccination, which affects their decision-making related to the vaccination of their children.*

Methods: *A descriptive method of work was used. In the framework of the research a survey was carried out. It was answered by the parents of vaccinated and unvaccinated children in relation to their search for information through modern digital sources of information on vaccination, and their impact on their decision for or against vaccination.*

Results: *The use of modern digital sources of information offers the possibility of finding information for and against vaccination and influences the parents´ decision on whether to vaccinate their children. 48 % of parents had secondary school education and 23 % university education. 88 % of parents vaccinated their children. 88 % of parents received appropriate information about vaccination. 82 % of the parents who did not receive enough information, didno't ask any additional questions about the vaccination. If vaccination wasno't compulsory, 26 % of parents would opt for a complete vaccination, 26 % would vaccinate their children against some of the contagious diseases and 7 % would not vaccinate their children at all. 75 % of parents searched for information about vaccination online. The most common sources are: articles (56 %), forums (21 %) and social networks (23 %). 51 % of parents spend half an hour per month on the search for information on vaccination on the internet. They focus on the information about vaccine safety (23 %), importance of vaccination (19 %) and undesirable effects of vaccination (19 %). 38 % of parents decided for vaccination on the basis of the information provided by their doctor; 56 % decided on the basis of doctor's and internet information.*

Discussion: *The internet is one of the sources that enables quick access to information about the benefits and side effects and the undesirable effects of vaccination and indirectly influences the decision for or against. Individuals receive negative information about the vaccination on the internet. It is important to create genuine trust in the people who administer the vaccine and the health system, and encourage them to decide according to the child's and society´s benefits.*

Keywords: *modern digital information sources, vaccination, health promotion, health information*

Izvleček

Uvod: *Uporaba modernih digitalnih virov informacij ponuja staršem pridobivanje pozitivnih in negativnih informacij o cepljenju, ki vplivajo na njihovo odločitev, cepiti ali ne cepiti otroke. Namen raziskave je ugotoviti, v kolikšni meri starši pri odločitvah glede cepljenja svojih otrok uporabljajo spletne vire in kakšen vpliv imajo na njihove odločitvah glede cepljenja ter odnos do cepljenja.*

Metode: *Uporabljena je bila deskriptivna metoda dela. Kot merski instrument je bil uporabljen anketni vprašalnik. 142 staršev je odgovarjalo na vprašanja o iskanju informacij o cepljenju preko modernih digitalnih virov in vplivu le teh na odločitev za ali proti cepljenju.*

Rezultati: *Uporaba modernih digitalnih virov informacij ponuja staršem možnost iskanja informacij in ima vpliv na razmišljanje dati ali ne dati otroke cepiti. 48 % anketiranih staršev je imelo srednješolsko, 23 % univerzitetno izobrazbo, 88 % jih je dalo otroke cepiti. Od zdravnika je 88 % staršev dobilo ustrezne informacije o cepljenju. Od tistih, ki jih niso dobili, jih 82 % zanje ni vprašalo. Če cepljenje ne bi bilo obvezno, bi se 26 % staršev odločilo za nepopolno in 7 % za necepljenje. Za pridobivanje informacij uporablja moderne digitalne 75 % staršev. Najpogostejši vir za iskanje informacij so za 56 % staršev strokovni članki, za 21 % forumi in za 23 % socialna omrežja. 65 % staršev išče po spletu informacije o cepljenju manj kot pol ure na mesec. Najpogosteje starši iščejo informacije o varnosti cepiv (23 %), o pomenu cepljenja (19 %) in o nezaželenih učinkih cepiv (19 %). 38 % staršev se odloča za cepljenje otrok na podlagi samo zdravnikovih, 56 % staršev pa na podlagi zdravnikovih in internetnih informacij.*

Razprava: *Splet je eden izmed virov hitrega pridobivanja informacij o prednostih in stranskih ter nezaželenih učinkih cepljenja, kar posredno vpliva na odločitev za ali proti. Odločitev o cepljenju je v rokah staršev. Posamezniki ustvarjajo preko digitalnih virov jedra negativnih informacij o cepljenju. Pomembno pa je, da ustvarjamo pristno zaupanje v cepitelje in v zdravstveni sistem ter jih spodbujamo, da odločajo v otrokovo in družbeno korist.*

Ključne besede: *cepljenje, promocija zdravja, zdravstvene informacije*

Introduction

Health promotion is one of the most important objectives of health care. Medical science made an effective step against contagious diseases with vaccination (Gorgijevski, 2016). The development and the use of vaccines has been one of the greatest achievements in medicine as it has contributed to the reduction of illness and mortality rates in infants and children (Štemberger Kolnik, Pereza, 2015). The results of systematic vaccination are shown by the vaccination rate; establishing the percent of vaccinated people in the target group. To gain herd immunity of the target group is it necessary to reach at least 95 % vaccination rate against measles and whooping cough (Kraigher, et al., 2011), while in other cases the vaccination rate could be a bit lower, but because of the combined vaccines, we have to set an aim of at least -

95 % of children being vaccinated in time (Kraigher, et al., 2011). With the reduction of vaccination rate there would be a possibility for the occurrence and expansion of certain contagious diseases (Kraigher, 2003). Emiglu (2003) published that strengthening of national programmes of immunisation to reduce and control the diseases that can be prevented with vaccination and to improve the programme of immunisation will be a high priority across Europe. Vaccination programmes are highly significant for the entire population. It is organized by countries by means of regulations (Božiček, 2008). The organisation of work for vaccination on a primary level is regulated with instructions from the Ministry of Health (Kraigher, 2006). The programme of compulsory vaccination for children from their birth to the third grade of primary school include vaccination against nine contagious diseases (Kraigher, et al., 2011).

Future parents obtain the first advice before their child's birth and then later at the children's counselling service. The doctor and the nurse complement one another when they give information. With proper information they can reduce parents' fear of vaccination and provide the parents with a feeling of safety (Božiček, 2008). We should constantly talk to parents about the meaning of vaccination, the advantages as well as possible complications. We should give them all the information, when they have not been filled with fears and doubts about vaccinations (Štemberger Kolnik, Pereza, 2015).

Before the vaccination the doctor should give the parents all the information necessary to make a decision. The doctor should give information in such a way that the parents understand. Despite the vaccination being mandatory and the fact that parents may face legal consequences if they refuse to vaccinate their children, the doctor must get oral or written permission from the parents voluntarily and on condition that they have been sufficiently informed. Before the vaccination the doctor should find out, if there are any medical reasons for not vaccinating the child or to postpone the vaccination. Also, parents can suggest not to vaccinate their child. If there are no medical indications against the vaccination of the child, if the parents want to avoid it or they stop it, the doctor must send a report to the regional office of Health Care Inspectorate (Kraigher, et al., 2011).

Healthcare workers are ethically, professionally, criminally and materially responsible for performing the vaccination. If the vaccination damages the health of the vaccinated person, they can demand compensation from the state budget (Kraigher, et al., 2011).

The attitude towards vaccination does not depend only on beliefs, but also on the trust in doctors and the health system (Gorgijevski, 2016). In Slovenia the vaccination rates against childhood contagious diseases, decreases every year despite good promotion. The percentage of vaccinated individuals has fallen under the critical limit (Slovensko zdravniško društvo, 2017, Nacionalni inštitut za javno zdravje, 2017). Vaccination rates in the Celje region for Di-Te-Per-Poli-Hib in 2011 were 98.3 %, (in Slovenia 96.1 %) and for OMR 98.3 %, (in Slovenia 95.5 %). In 2016 in the Celje region vaccination rates for Di-Te-Per-Poli-Hib were 96.6 % (in Slovenia 94.1 %) and for OMR 96.6 % (in Slovenia 92.3 %) (Nacionalni inštitut za javno zdravje, 2017).

A long absence of some contagious diseases, lack of knowledge and less fear can cause doubt about the use of vaccinations among the general public (Gorgijevski, 2016). The most common reason for total or partial rejection of vaccination is different beliefs and life-style of the parents with unvaccinated children (Štemberger Kolnik, Pereza, 2015).

In England most parents search for information about vaccination on the internet, but healthcare workers still remain a very important source when it comes to giving information about vaccination. Parents trust doctors highly, so they very often influence parents' decisions (Campbell, et al., 2017). In the Netherlands, the rejection of vaccination is often associated with the family´s lifestyle, the perception of a child's body and their immune system, the perception of the risk for illness, effectiveness of vaccination and unwanted effects, the perception of advantages, how to experience the illness, previous negative experience and the social environment (Harmsen, et al., 2013).

There are many issues related vaccination and some parents are afraid of the consequences. No healthcare provider can secure them with complete safety with regard to the possible consequences of vaccination. Parents must opt for the vaccination themselves and they are responsible for their decisions. This is the reason why they search for information about vaccination in many different ways.

Use of modern digital information sources (internet) offers parents a collection of positive and negative information about vaccination that can influence their decision to vaccinate their children or not. According to the survey, 80 % of internet users search for health-related information on the internet; 80 % of them search for information about vaccination. It is not however, clear how many of these users search or intend to obtain information about vaccination from social networks. But we know that opponents of vaccination exchange their information regularly on social networks. They use social networks as one of their primary communicative tools (Vinkovič, Železnik, 2013). It is important that the health profession is aware of these sources of information and that it also offers information on these topics (Slovensko zdravniško društvo, 2017).

Unfortunately, internet users can also find unprofessional information on the internet. Increasingly more people use the internet and internet literacy is common among young people, so higher accessibility of internet information, together with the lobbying of orthodox opponents of vaccination, may influence the parents´ decision not to vaccinat.

The aim of the survey is to establish how many parents use the internet, what kind of sources they use, and the role of the internet on making the decision of whether or not to vaccinate the child, as well as the parents' attitude towards vaccination.

Methods

A quantitative approach and a descriptive method were used in the survey. Primary and secondary sources were collected and analysed for the empirical part. Primary sources were obtained with a questionnaire. The secondary sources were collected with the help of scientific writing. The survey took place in October 2017. It covered the area of the regional office

Šmarje pri Jelšah and Brežice. 142 parents with children aged 3 months to 8 years (the third grade of primary school) participated in the survey. The questionnaire was anonymous and it was conducted with the permisson of health centres directors. There were 13 questions in the survey including gender, age, education, attitude towards vaccination, sources of information found about vaccination, the role of the internet, internet information sources, of information searched, the period of searching for information, the time used for searching information, and the definition related to what influenced their decision to vaccinate.

Table 1. Socio-demographic characteristics of the sample

	Total population N = 142 N (N (%))
Gender	
Men	25 (18 %)
Women	117 (82 %)
Age	
18-24	9 (6,4 %)
25-30	31 (22 %)
31-35	30 (21 %)
36-40	36 (25,5 %)
> 40	36 (25,3 %)
Education	
primary school	6 (4 %)
secondary school	68 (48 %)
higher education	35 (25 %)
university education	33 (23 %)

Results

Table 2 shows that 88 % of parents vaccinated their children according to the vaccination calendar and 12 % did not. Table 3 shows that 88 % of parents received adequate information on the vaccination of their child by the doctor, and 12 % did not. Table 4 shows that parents indicated 18 % that the doctor did not have enough time, and 82 % did not ask them any additional questions.

Table 2. Vaccination of children by vaccination calendar

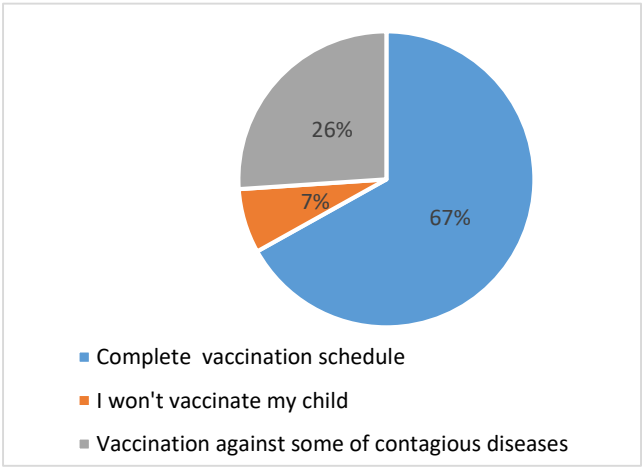
	f (%)
- yes	125 (88 %)
- no	17 (12 %)

Table 3. Obtaining appropriate information on the importance of vaccination and vaccines by a doctor

	f (%)
- yes	125 (88 %)
- no	17 (12 %)

Table 4. The reason why your doctor's vaccination information was inadequate

	f (%)
- Doctor does not have enough time	3 (18 %)
- I did not ask any further questions	14 (82 %)



Picture 1. Parents' decision to vaccinate if it was optional

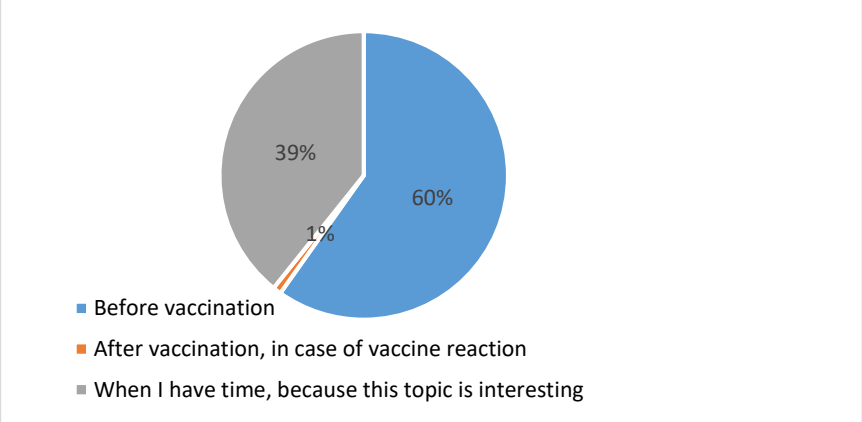
Picture 1 shows that if vaccination was optional, 67 % of parents would decide on a complete vaccination schedule, 26 % for incomplete vaccination and 7 % of parents for no vaccination.

From Table 5 it can be seen that 75 % of parents search for information on vaccination on the internet and 25 % do not.

Table 5. Internet information about vaccination

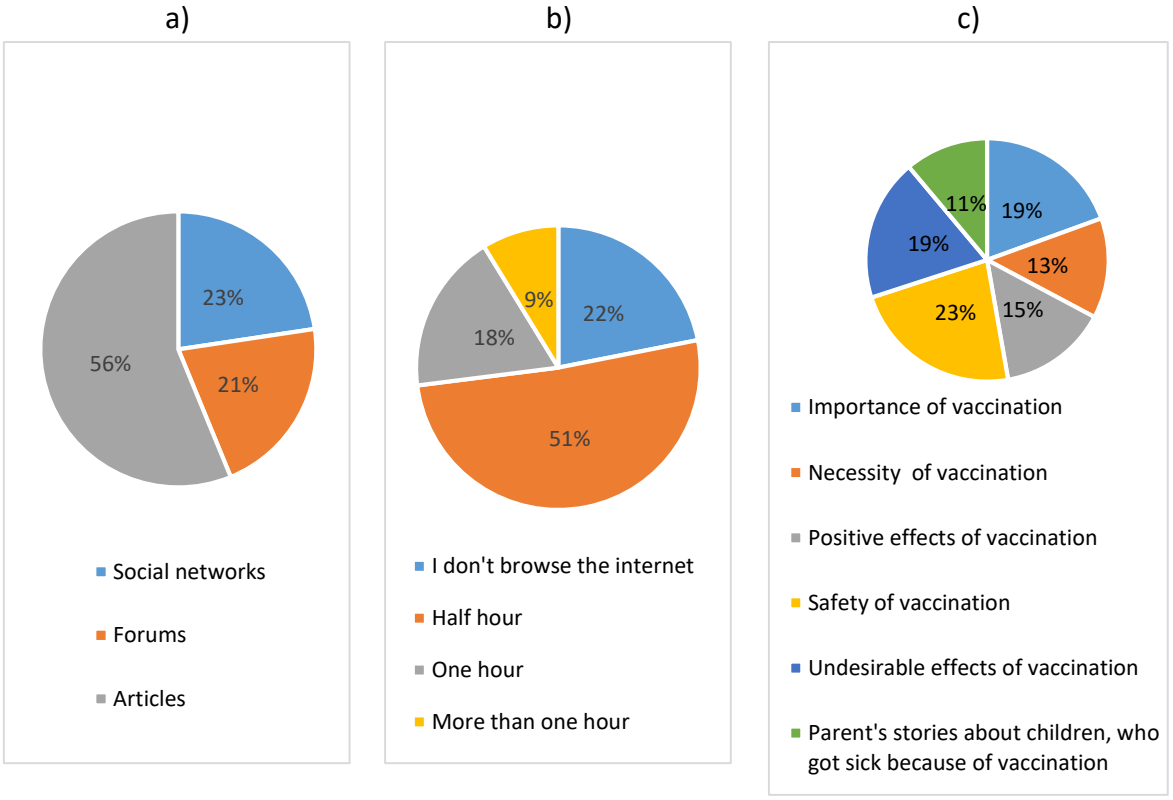
	f (%)
- I search for a vaccination programme on the internet	106 (75 %)
- I do not search for a vaccination programme on the internet	36 (25 %)

Picture 2 shows that 60 % of parents browse the internet before vaccination, 39 % when they have time and 1 % in case of a post-vaccination reaction.

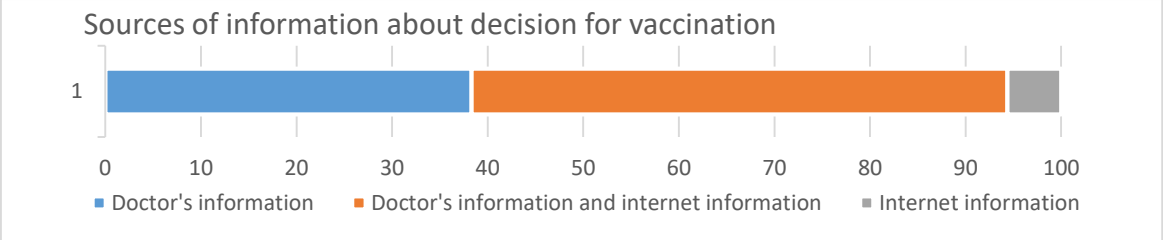


Picture 2. Time of information search on the Internet

Picture 3 a shows that 56 % of parents most frequently read articles on the Internet, 23 % of parents use social networks, 21 % of parents use the forum most often. Picture 3 b shows that 51 % of parents are browsing the internet for up to half an hour, 18 % an hour, 9 % more than an hour per month, and 22 % do not surf the internet. Picture 3 c shows that 20 % of parents search the internet to find information on the importance of vaccination for children, 13 % of parents on the need to vaccinate children, 15 % of parents on positive effects of vaccination, 22 % of parents on vaccine safety, 19 % of parents on unwanted effects of vaccines, and 11 % of parents read the stories of parents of children who have suffered negative consequences from the vaccination.



Picture 3. Demonstration of the most commonly searched digital information sources, time used for looking up information on vaccination, and demonstration of searches for digital information connected with vaccination



Picture 4. Demonstration of sources of information about the decision for vaccination

Picture 4 shows that 38 % of parents decide to vaccinate their child on the basis of the doctor's data, 6 % of parents on the basis of information from websites, 56 % on the basis of information provided by both the doctor and on-line information.

Discussion

The paternalism of healthcare workers around the world, in Slovenia and in the Šmarje pri Jelšah administrative office, is moving towards a partner's relationship with users of internet services. In the Šmarje pri Jelšah administrative office the children are usually brought to vaccination by their mothers (or both parents). The age structure of the mothers is almost evenly arranged with half of them having secondary school and one-quarter university qualifications.

In the Šmarje pri Jelšah administrative office almost nine-tenths of parents vaccinate their children according to the vaccination schedule. The percentage of vaccinated children might be higher because some children were incompletely vaccinated. This is comparable with vaccination in the Celje region. Vaccination rates in Slovenia and in the Celje region have decreased, but in the Celje region they better than in Slovenia. It also decreases parallel to the treated area. Therefore, it is possible, that the percentage of vaccinated children mentioned in the survey is close to reality, based on the evidence suggesting a decrease of vaccination through the years. Almost all the respondents who vaccinated their children felt they had, received appropriate information about the vaccination from their doctors. The respondents, who did not receive appropriate information, did not even ask any additional questions. We assume that the parents who did not vaccinate their children did not ask any questions because they had already decided not to vaccinate them, a decision that was based on their own reasons.

If vaccination was optional, only seven tenths of parents would decide for complete vaccination schedule, one quarter for incomplete vaccination and only some parents for no vaccination. We assume that some parents would think that vaccination was not relevant anymore because it is not compulsory.

All parents use the internet to find information about the vaccination before the vaccination, three fifths prior to vaccinating, and two fifths in the meantime, because they find the topic interesting. We assume that these parents are not addicted to internet information.

More than one half of the parents search for academic articles on the internet. By doing this they demonstrate a more serious approach when they want to clear up vaccination dilemma. Almost one quarter of parents search for information on forums, while a little less than a quarter

of parents search for information on social networks. Social networks are primary communicative tools for movements against vaccination, so almost one quarter of parents get distorted facts. Some information sources present vaccination as being harmful to one´s health. That is the reason why some parents are afraid of vaccinating their children or they think vaccination is dangerous for health or is not necessary. The parents first get negative and unprofessional information on the internet and then they stop searching for relevant and professional information about vaccination. Most English parents search for information on the internet, but healthcare workers are the ones, who influence their decision on whether to vaccinate their children or not. In the Netherlands, among others, the rejection of parental vaccination is significantly influenced by family lifestyle, alternative beliefs and a social environment, which is also comparable with the reference to the source for our environment. Most of the participants in the Šmarje pri Jelšah administrative office search for internet information about vaccination for about half an hour per month. These parents trust the doctors who vaccinate their children. Their final decision on vaccination is a combination of doctor's and digital information. Only a smaller percentage of parents decides on vaccination strictly under the influence of digital sources. This percent probably also contains the largest part of those parents who did not vaccinate their children.

Conclusion

There is a lot of poor quality information on the internet and most parents in the presented region still listen to the doctor´s and the nurse´s advice. Many parents are influenced by the information found on the internet. Parents are becoming more demanding about the information. They can find many positive, but also negative, content on the internet. People who are distrustful by nature may become even more distrustful due to, negative information. It is therefore important that health professionals publish positive expert information on the internet as a counterbalance to the poor information. It is important that this information also includes the field of social networks and forums. Therefore, healthcare workers should convince the parents to come to the right decision. They should explain to them the meaning and relevance of vaccination, but at the same time the parents should also take a little risk, which is smaller than the possible consequences of unvaccinated children. Health workers, therefore, play an important role in persuading parents about vaccination, and have the ability and duty to act on the internet. However, in the future, the government will also have to take a decisive action with relevant legislation.

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THE INTERNET AND HEATHCARE SYSTEM IN RUSSIA

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Abstract

The Internet is a major part of today's reality and therefore also of health care. The paper describes the current situation regarding Russian healthcare from the perspective of patients, physicians, the government and business. Although all the main healthcare market stakeholders have gained definite benefits from using the Internet, there are also some drawbacks and threats that need to be resolved in the near future. In early 2018 medical services available via the Internet came under state law. Therefore, the involvement of the Internet in the Russian healthcare system will not only be enhanced but it will also have a legal standing, which will bring about various consequences.

Keywords: *Internet, health care, e-health, telemedicine*

Introduction

The Internet age offers many possibilities for improving healthcare. The first attempt to legally regulate the Internet and its impact on Russian healthcare was made in May 2016. Proposals for new laws were prepared by the Institute of Internet Development together with Yandex (the biggest search engine in Russia) and presented to the State Duma (Vedomosti, 2016). In the middle of April 2017, the Ministry of Health introduced its own proposals describing regulations for providing medical services on the Internet to the Government of Russia (Rosminzdrav, 2017). Since then, discussions on this subject in the Russian society have been escalating. Findings presented in this paper are based on the discourse analysis of the open Internet resources related to health issues in the period from April to December 2017, when the discussion hit a peak. Key sources for the research were publications produced by groups with a strong interest in the healthcare field and its relationship with the Internet. The total number of participants in pertinent Internet groups is 30,038. The participants of these communities are physicians, managers of medical organizations, representatives of governmental bodies, patients of different age and gender and individuals of different professions. The total number of researched publications in related news portals is 64, posts on Facebook 63, with 20 being the average number of comments. To obtain an overall understanding of the situation, Russian healthcare was analyzed from the perspective of four main stakeholders: patients, physicians, the government and business. The government uses various technological instruments for monitoring and managing the Russian healthcare system. Physicians can receive up-to-date medical information and knowledge, and use and upload information in various databases. In

doing this, they can expect professional support using telemedicine. In addition, patients have become more informed (Swee-Lin Tan, Goonawardene, 2017), can use medical terminology and are better prepared for communication with their physicians. Business structures are also interested in e-health today and expect high profitability from their investments.

On the other hand, there are also many drawbacks of health care digitalization. Firstly, governments must make big financial investments to create a well-organized e-health system. Secondly, the medical profession has expressed great concern regarding incorrect information available online and patients' interpretation thereof. Moreover, the business sector has just received legal standing for providing medical services online, however, there are many issues that need to be addressed. This paper will describe the current situation of Russian healthcare regarding the Internet. Furthermore, the impact that the Internet has on this field and certain assumed future trends will be included for discussion.

Main Market Stakeholders

The Government

Traditionally, a patient and his physician were the two main parties of healthcare. Since Soviet times, the healthcare system has been supported and controlled by the government. Every Russian citizen is entitled to obligatory medical insurance (OMI) which amounts to 5.1% of their income and is paid by an employer or an individual entrepreneur on a monthly basis (SPMAG.RU, 2016).

The Fund of Obligatory Medical Insurance (FOMI) collects all deductions and consequently Russian citizens are guaranteed access to free medical services such as (FB.RU, 2015):

1) Emergency (except for sanitary evacuation services);
2) Specialized;
3) Preventive and primary health care;
4) Treatment of diseases included in the basic program;

Furthermore, FOMI is replenished by allocations of regional governments, which enables other free medical services:

1) Palliative;
2) All diseases according to the OMI program;
3) High-tech;
4) Services for insured and non-insured patients;
5) Specialized emergency;
6) For conditions and diseases outside of the general list, for example, tuberculosis, psychiatry, narcology, etc.

In addition to the Obligatory Medical Insurance any Russian citizen may also have Optional Medical Insurance.

In accordance with the Strategic Program of the Russian Healthcare Ministry (Kommersant, 2017), a national patient-oriented healthcare system is planned to be introduced by 2025. From 2020 to 2025 the United State Informational Healthcare System is planned to be implemented. 40 billion rubbles (570 million euro) have already been invested in this project. The system is first and foremost aimed at managing the healthcare field, handling the logistics within the pharmaceutical market, evaluating the quality of public health, accessing patients' medical data, enabling easy access and management of physicians' patient appointments, and fast and detailed feedback from patients. As it is stated in the Strategic Program, innovative medical technologies such as 'big data application', genome edit, regenerative medicine, microcephaly and multiplex technology, microfluidic devices, nano-container systems, the creation of tissue and organ equivalents, additive technology, 3D printing organs, robotic prostheses, human-machine interfaces, nuclear medicine and Artificial Intelligence are also priorities in healthcare development during this period.

Telemedicine from the perspective of the Russian government is an appropriate instrument that might compensate for the lack of medical resources, especially in remote areas of the country. Physicians from small clinics in remote villages will be able to obtain support from other medical professionals located in federal and regional centres. Patients will be able to communicate online with any medical centre in the country to receive a consultation. Physicians' workload will be higher, but the burden on the federal budget will decrease. For example, in the case of remote communication between a physician and a patient, twice less money from the budget will be spent per patient with acute respiratory disease than nowadays, when a patient must go to the clinic to receive treatment (RIA, 2017).

Main Market Stakeholders

Business

Over the last two years, IT companies have invested more than 1 billion rubles (14 million euro) in telemedicine projects (RBC+, 2017). Telecommunication companies (the big four – Rostelecom, MTS, Beeline, Megafon), banks (Sberbank and VTB Group) and insurance companies have shown their interest in e-health in 2017. Many e-health portals were started in the previous year, while some have been working successfully for several years already (Yandex.Health https://health.yandex.ru, Doc+ https://docplus.ru, Ondoc https://ondoc.me, Pediatrician 24/7 https://pediatr247.ru, On-line Doctor https://onlinedoctor.ru, etc.).

61% of Russians were ready to receive remote medical services in accordance with the results of the survey by the NAFI analytical centre (conducted jointly with the 'TeleMed' company) (NAFI, 2017). Meanwhile, only 1% of Russians have already tried these kinds of services, 25% of respondents have heard about them and 5% knew them, but had never had a chance to try them.

In accordance with the survey of the National Research University of the Higher School of Economics (Institute of Healthcare Economics, 2017), 80% of Russians are willing to have an on-line consultation with their physicians and the same proportion is willing to have an on-line consultation with an unfamiliar physician in order to get a second medical opinion.

In the near future, Russian patients will be able to receive remote medical consultations at their work places in small private rooms arranged by their employers. The same types of medical services will be organized in busy places such as banks (Sberbank together with DocDoc) or pharmacies (Doc+).

An average price per consultation acceptable to Russian patients is 500-700 rubles (7-10 euro), as has been evaluated by the IPT Group (IPT Group, 2017). A competitive marketplace, however, has forced Yandex.Health to offer the same service at a reduced price of 99 rubles (1,4 euro) for the first video or chat consultation with a doctor and the subsequent ones at 499 rubles (7 euro). In general, the price depends on the physician's qualification. Also, the second medical opinion is more expensive, especially when given by a foreign clinic. The cost of this service generally varies from 210 to 425 euro. The most popular fields of e-health in Russia are pediatrics, gynecology, and dermatology (RBC+, 2017).

Other potential categories of e-health might include patients with chronic diseases such as diabetes, cardio-vascular or endocrinological diseases. Monitoring of physicians' opinions and discussions on the Internet shows that physicians believe on-line consultations to be acceptable in these kinds of cases. These patients are more disciplined and are used to managing certain aspects of self-care (RBC+, 2017). Medical documents allow a physician to determine the vector of further medical examination and treatment, and even to write prescriptions.

Russian e-health services also consider transport companies as a potential target audience. Bus drivers, train drivers and pilots must pass medical check-ups regularly. Every employee has a medical card with detailed information on it and records, thus on-line consultations might save employers time and money.

Annual expenditure for telemedicine by the Russian government is estimated to be around 8.5 billion rubles (120 million euro) (RBC+, 2017), but so far, these kind of services are not included in the Obligatory Medical Insurance program and are consequently not free for the Russian people.

Beginning in 2018, it will be officially and legally possible to provide online medical consultations, which are based on the e-health state law that was passed in the middle of 2017. Nevertheless there are still many issues to be resolved and decided upon.

Main Market Stakeholders

Patients

And what about patients? According to Yandex (the most popular search engine in Russia) research, health is one of the most frequently searched topics on the Internet searches. Health-related searches represent over 4% of searches with more than 7.5 million a day. Every minute, Yandex is asked about health more than 5,000 times (Yandex.Research, 2016).

Three of the most common search inquiries related to health are about drugs and medication, diseases and symptoms, as well as clinics and physicians. Many search inquiries overlap

because very often users ask about related topics at the same time, such as diseases and nutrition, vitamins and pregnancy, and symptoms and medication.

Drugs and medication are the most frequent search inquiries related to health. 34% of users seek information about medication, herbs and other healing substances, and nutritional supplements.

In approximately 30% of Internet searches, people enter query terms such as a specific disease or health problem and also search for a description of the symptoms (Yandex.Research, 2016). Also, a person who already knows their diagnosis, might search for more detailed information about the diagnosis, prescriptions and possible treatment after they have visited their physician. In addition, a person who does not know their diagnosis yet might enter words related to their symptoms and feelings into the search engine before or instead of visiting a physician.

The analysis of heated debates on the Russian language Facebook pages related to on-line health consultations and e-health program implementation has shown that there are plenty of advantages of the Internet in Russian healthcare, but at the same time there are also numerous disadvantages. The total quantity of analysed posts in the Russian segment of Facebook is 63, the total number of likes is 19,989, shares 4,765, and comments 560:

1) Patients have gained access to 24/7 medical support. Although the quality of such support might be questionable and in some cases, risky, lots of minor problems might easily be solved remotely, which could save time and money, both for patients and physicians.
2) Patients can learn more about the symptoms that bother them and also specific terminology. They not only feel confident but they also understand exactly what their physician has talked about. Consequently, the quality of the patient-physician communications is improving.
3) Patients and their relatives form different kinds of communities on the Internet where anybody might expect psychological, medical, everyday and sometimes even financial support. However, sometimes medical advice from people who have had the same or similar medical symptoms have a negative implication. Patients might stop following their physician's advice and/or stop taking their prescriptions. They might begin doing what other people from the Internet community did in similar situations because for some people, their self-diagnosis was accurate.
4) Coherent feedback and advice is another positive side of Internet involvement in health care. It is definitely better to know more about the physician you are going to see, or read in detail about some medical procedures that might be needed. On the other hand, many companies post fake or exaggerated feedback about their services or products, and for many people it is not easy to differentiate paid or authentic content.

Table 1. Special groups on the Russian language Facebook where pressing medical topics are discussed regularly

Groups FB	Likes	Subscribed	
Medical Russia	3963	4500	https://www.facebook.com/medrussia03/
Evercare.ru	1727	1852	https://www.facebook.com/evercaremhealth/
Opinions about healthcare		15929	https://www.facebook.com/groups/179139158799444/
Medical dialogues	25882		https://www.facebook.com/groups/meddialog/
Telemedicine magazine E-health	976	1067	https://www.facebook.com/jtelemed.ru/
Physicians protection league		6690	https://www.facebook.com/groups/medshield/about/
TOTAL users	**32548**	**30038**	

Main Market Stakeholders

Physicians

Physicians exist in the same digital environment. They use messenger services to communicate with their patients easily, they are active users of professional communities where they might not only access up-to-date knowledge for self-study and professional support and consultations, but also psychological and even legal advice. On the other hand, some representatives of the medical profession still insist on their sole possession of medical knowledge (Gerber, Eiser, 2001). The average age of Russian physicians is 46.7 years old. Furthermore, the percentage of medical doctors of all specialities under 39 years of age is 33.5%, pre-retirement (50-54 years of age) – 14.4%, 55 years of age and more – 26.4%. (Social aspects of public health, 2010). Hence, the majority of medical professionals received their medical education in the USSR. Those who studied in the 90s were influenced by the Soviet medical school tradition, which was characterized by a paternalistic model of doctor-patient relationships. The majority of Russian physicians (57%) prefer to determine the amount of information necessary for their patients. 56% of physicians are active supporters of the paternalistic model, 23% passively support the approach (Chebotareva, 2006). This is why it is hard for Russian physicians to accept the fact that due to the Internet patients are nowadays generally better informed about their health. Physicians still frequently contradict any opinion expressed by patients, while patients are already ready to take an active role in making a decision concerning their health together with their physician.

Physicians can see all the potential risks that come with an informed patient. Since the time of Jerome K. Jerome and his book *Three Men in a Boat (To Say Nothing of the Dog)* written in 1889, not much has changed. J. K. Jerome describes an appointment with a physician after the main character visited the library at the British Museum and studied the medical encyclopaedia from A to Z. “I will not take up your time, dear boy, with telling you what is the matter with me. Life is brief, and you might pass away before I have finished. But I will tell you what is NOT the matter with me. I have not got housemaid's knee. Why I have not got housemaid's knee, I cannot tell you; but the fact remains that I have not got it. Everything else, however, I HAVE got" (Jerome, 1889). The same situation might happen today when patients know their diagnosis in detail and they only need the physician to confirm their assumptions.

Conclusion

The Russian society today is undergoing rapid changes, which especially relates to healthcare. In addition, the global trends of digitalisation have also affected Russia. Although the main healthcare market stakeholders understand the imminence of the Internet in Russian healthcare, nonetheless heated discussions on the topic are frequent in today's Russian society. Patients will use the Internet to search for information about their health more and more often. Physicians express concern regarding the quality of such information available on the Internet, but understand that they will have to adapt to the new type of patient. The government understands the necessity of regulating the Internet's involvement in healthcare, but at the same time it has its own projects of healthcare digitalisation that are aimed at reducing budget costs. Business structures recognise the major potential of e-health projects, but understand all the risks they will have to bear. Minimising the potential risks of the Internet in Russian healthcare, and the creation of a stable and effective system from which everybody would benefit are the key priorities for the near future in Russia. My research has a number of limitations as the investigated on-line publications and numerous comments might not represent a comprehensive selection. However, my current research is supposed to be the second part of the whole project, which is based on a quantitative analysis and deep interviews with the main Russian healthcare market stakeholders (patients, doctors, representatives of governmental and business structures). I believe that the main trends will remain the same as those described in the paper. On the other hand, a multilateral discussion is necessary to work out a detailed list of recommendations on how to adapt international experience into Russian healthcare as well as potentially contribute internationally with the Russian experience.

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ELDERLY AND THEIR ATTITUDE TOWARDS TELECARE TECHNOLOGY

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Abstract

Introduction: *The number of people over 65 is growing twice as fast as the growth of the entire population. With the increasing life expectancy, the cost of care also increases. With the introduction of telecare technology to the ageing population, the elderly would be able to live in home environment despite limitations imposed by old age. The purpose of the article is to determine the attitude of the elderly towards this technology that would allow them to live at home and could help improve the quality of ageing.*

Methods: *Databases DiKul, ScienceDirect and Google Scholar were used for the literature review. The search was performed with the following key words: elderly, technology, living at home, telecare, gerontechnology. The analysis included research of literature published in the English language through the period from 2012 to 2017.*

Results: *Out of a total of 1098 hits, 12 studies were included in the final analysis, an overview of which shows that the elderly are willing to accept technological devices in their home if they acknowledge them as useful and are provided with support and assistance in using it. The most common reasons for non-use are discomfort at the thought of being monitored, fear of technology and its complexity, high cost of devices, and stigma. The latter is the reason why the devices are sooner accepted by those who perceive themselves as old and are aware of their limitations.*

Discussion: *The review has shown some key points that are important in adopting technology in everyday life of the elderly people, which can contribute to a higher quality of an individual's life.*

Keywords: *[elderly, technology, living at home, telecare, gerontechnology]*

Introduction

The ever-increasing number of elderly people represents a great challenge both for Slovenia and other countries alike (SURS, 2015). The term *elder* typically refers to a person aged at least 65 years (SURS, 2017). In general, the elderly are more prone to developing medical conditions than other age groups (Wang, Yang, and Dong, 2017), which is reflected in a drastic increase in the costs of care (Mostaghel, 2016). Among the problems the state is facing due to the rapidly aging population are also the crisis of the health-care system and pension schemas, the

innovative capacity of economy, and the social relationships between different age groups (Piene, et al., 2014). The majority of elders would like to live in their home environments for as long as possible and they consequently show a great interest in the technology that would enable them to do so (Piau et al., 2013). Telecare systems are technical equipment that enables the provision of management, care, and medical services at a distance. The systems can be connected to a server that stores and, more importantly, transfers data to family members or care workers, notifying them of any unusual events. Most frequently, telecare systems are intended to detect falls, control sleep, determine whether the person is in a particular room, and monitor their vital functions (heartrate, blood pressure) (Labonnote and Høyland, 2015). Additionally, the elderly can use telecare systems to access their medical records, make appointments for control medical examinations, renew their prescriptions (wherever it is possible to do so online), communicate with other people, access different information, and purchase medical tools online (Sixsmith and Gutman, 2013). All of the above can contribute to a feeling of greater security in people who live alone (Piau et al, 2013) and prevent their dependency on the assistance of others, ultimately encouraging their independency (Mostaghel, 2016). It is essential for the elderly to preserve the control they have over their own lives, even in cases when they require assistance (Bonaccorsi, et al., 2016). The purpose of this paper is to study the available telecare systems, user experiences, and user opinions about these systems, and determine if these systems can contribute to a better quality of life in the advanced age.

Methods

Review methods

The literature review was performed in accordance with the Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green, 2011) that prescribes the following steps: 1 – defining the problem of the literature review; 2 – developing a strategy for the search and selection of studies; 3 – quality assessment; 4 – summarizing, analysing, and joining data from the studies; and 5 – making conclusions. This method enables the acquisition of different data and scientific findings, ensuring a comprehensive understanding of the selected topic. The search for and the collection of literature was done by means of the DiKul, ScienceDirect, and Google Scholar databases. The English keywords used in the database queries were: elderly, technology, living at home, telecare, and gerontechnology; in different combinations and conjoined by means of Boolean operators “and” and “or”. The criteria for the selection of the articles were: access to the whole text, English language, published between 2012 and 2017, and published in a scientific journal. The potentially

suitable articles were further selected on the basis of an abstract review, and the included articles were selected on the basis of a review of the entire texts.

Review results

The database searches produced a total of 4,928 articles that met the criteria. Upon the exclusion of duplicates, the number of concordances dropped to 1,098. A total of 208 titles and abstracts relating to the elderly with medical conditions and the use of technology were studied.

The criterion for inclusion in the study was that the article involved the population in question, namely, the elders who participated in home-based technological programmes and studied their effects. The detailed analysis included a total of 12 studies comprising 5 qualitative studies, 1 combined study (qualitative and quantitative), 4 ethnographic studies, 1 descriptive cross-sectional study, and 1 case study research. The common feature of all these studies is that they all involve home-testing of telecare systems by the elderly, with the exception of users in palliative care where not all the users belong to the oldest age group.

Results

Table 1. An overview of the articles reviewed

Author, year of publication, country	Method	Sample	Purpose	Tested equipment	Findings
Aceros, Pols and Domènech, 2014 Spain	Ethnographic study	N = 13 Age not specified	To present telecare systems to the home-living elders	A personal alarm system (a home unit and a pendant with an alarm button)	Telecare is better accepted by users who acknowledge their own limitations. Users carry the pendant either selectively (whenever they feel something might happen to them) or routinely (they forget to use it because they have grown so used to it). It only works in the house, social support is necessary, and there is a fear that the device would replace direct contact with people.
Chou, et al., 2013 Taiwan	Descriptive cross-sectional study	N= 105 64 - 85 years	To study the effects of telecare systems on the quality of life and the elderly users' experiences	A telecare system with screens for monitoring and keeping track of vital functions, making phone calls, setting reminders, and contacting the 24-hour support centre	Most users believe that the telecare system has helped them keep track of their health and monitor their medical conditions. They think it is useful for their health, gives them a feeling of security, and they are willing to use it. However, the price is a major drawback. The system grants them access to knowledge about their health. They prefer personal interaction over video calls and they do not believe that using a telecare system would result in less frequent GP visits.

Frennert, Forsberg and Östlund, 2014 Sweden	Combined qualitative-quantitative study	N =11 > 60 years Users with one or few chronic conditions in medical care who are at a high risk of falling	To present the results of the GiraffPlus System at users' homes	GiraffPlus (with sensors and a semi-autonomous robot)	They want as few new devices with as many functions as possible in their homes. They find reminders useful, approve of data being stored in the cloud, but do not want to have video cameras. Many believe that monitoring daily activities is useful for those suffering from poor health.
Greenhalgh, et al., 2013 England	Ethnographic study	N = 40 60 – 98 years	To study what matters to the elderly in need of such technology, how disease affects the ability to use tools, and set the guidelines for future developments in the design of such technology	Different devices (alarms, sensors, fall detectors, etc.)	Most of the technology currently available on the market fails to meet the needs of the elderly – flexible components need to be developed. The participants in the study welcome the contact with family and friends most – some feel socially excluded and lonely. They find the pendants useful because they give them a feeling that if something were to happen to them, they would not be helpless. Those who have not used the system do not see its potential. The most important thing is that they are familiar with availability of such technology and believe that it works.
Greenhalgh, et al., 2015 England	Ethnographic study	N = 40 60-98 years Users with multiple conditions and a need to perform daily activities	To study the obstacles in telecare system takeover, and to get an insight into the users' lives, experiences, and technology use	Various systems by 7 anonymous technology companies	Telecare equipment can prove useless for an elderly if they are unable to control it or do not have the proper motivation. Frequently, the usability of such devices depends on the willingness of the family, friends, or care workers to assist in the use. Standardized products are rarely useful for people who have complex medical conditions, so it is essential to develop a telecare system that would adapt to the individual's needs.
Mort, et al., 2013 England, Spain, Norway and the Netherlands	Ethnographic study	N =166	To study the ethical problems that arise with the installation of different telecare systems	Health Buddy, PAL4, SecurityNet, some unnamed systems	Telecare does not provide care per se – the help of family members or care workers is necessary. The systems bring new responsibilities and affect the individual's privacy. The systems have been used in non-urgent situations (seeking social contact). The

					systems need to be adapted to the individual's needs.
Neven, 2014 The Netherlands	Qualitative study	N = 58 Age not specified Users who want to spend old age at home	To analyse the development and test the use of a telecare system for the elderly with serious medical conditions	AIMS (Ambient Intelligent Monitoring System)	An effective and reliable method of home care that makes it possible for elders to stay at home and which makes the everyday lives of the users and their families easier. By installing the devices, we alter the home environment, which is what users should be notified about prior to installation of the system.
Sanders, et al., 2012 England	Qualitative study	N = 22 Age not specified Users with diabetes, impaired cardiac function, or COPB.	To determine the obstacles for participation in the study and the acceptance of telecare systems	A screen connected to various tools for measuring blood pressure, sugar, oxygen, etc.)	Many decided not to participate in the study and test the device due to second thoughts about close monitoring. Instructions are necessary, and it takes time to provide good instructions that would alleviate anxiety. Support provided by the manufacturer plays a vital role in user satisfaction.
Saracchini, Catalina and Bordoni, 2015 Italy	Qualitative study	N = 48 (35 elders)	To assess the impact of technical tools on social interaction, and study the acceptance of telecare systems and their usability	An experimental help system (a tablet and a pendant equipped with a mini projector and a camera)	At first, many felt insecure and embarrassed, however, this quickly changed to curiosity and excitement. Following the testing period, two major problems arose: the dependency on the system and facing negative reactions. Lonely users quickly grow attached to the new possibilities of social interaction and respond accordingly once they lose this possibility. The spotlight was on keeping in touch and communicating with friends and family by means of the new devices. For elders with cognitive problems, controlling the system is too difficult. The device grants access to education and, consequently, provides cognitive stimulation and the prevention of social exclusion. The look of the device is important.

Stern, et al., 2012 Canada	Case study research	N = 11 34 -91 years Users in palliative care	To study the patterns, user perceptions, and user experiences with the use of telecare systems	Tele-Nurse (phone call or video call)	Users were satisfied with the fast and easy access to professional staff and their opinions, the ability to make video calls, and the facilitated access to useful information. Though they generally found the device to be easy to use, they still experienced some difficulty controlling it. The general opinion is that the device is more useful in early stages of disease.
Vines, et al., 2013 England	Qualitative study	N = 21 66 - 91 years Live alone	To study the significance of motion detectors at the homes of the interviewees	SHeL (Safe Home Living)	Many were insecure about data management, namely who has access to it, how it is presented, how often it is reviewed, or if it is reviewed at all. They have a feeling they are being monitored and doubt the system is working at all. They want to have control over transmission of data. At first, they opposed the fact that they were being monitored; however, in majority of users this feeling subsided in a few days. The users who are in a poor health condition are more willing to accept this system, often to make daily life of their relatives easier.
Wu, et al., 2014 Taiwan	Qualitative study	N = 7	To study the key elements of telecare systems that the elderly find important, determine the needs of the elderly, and compile a plan for future development accordingly	15 different telecare systems	The most frequently used functions are the notifications about unusual events, and the least frequently used function are the tips on a healthy diet. The elderly have a positive attitude towards the technology but they cannot afford it due to its price. One of the greater future challenges for telecare systems is making them more affordable.

Discussion

The review and analysis of the articles leads to a conclusion that telecare systems exhibit a great potential. They have a positive effect on the quality of life, promote home independency in elders, improve their health (Mostaghel, 2016), and provide a greater feeling of security, especially when users live alone (Piau, et al., 2013). With an effective alarm system management, the consequences of unpredictable events (falls or sudden health deterioration) could be mitigated to a certain extent (Wang, Zang and Dong, 2017). When using the

equipment, the elderly are excited and inquisitive, they have a positive attitude towards the technology, and want to be involved in the digital process (Saracchini, Catalina and Bordoni, 2015; Wu, et al., 2014). Because they see the potential in telecare systems and truly believe that they can benefit from them, they are willing to embrace them and accept them without major difficulty (Vines, et al., 2013). The majority of devices are installed in the kitchen, followed by the bathroom, bedroom, and hallway. The most commonly controlled objects are medicinal drugs, cup, and the bed; followed by the stove, oven, water heater, and coffeepot (Labonnote and Høyland, 2015). Telecare systems bring new responsibilities (e.g. charging batteries) (Mort, et al., 2013), grant access to education and the information available online, and enable the elderly to stay in touch with their contacts; and ultimately, promote cognitive stimulation and reduce social exclusion. (Mort, et al., 2013; Saracchini, Catalina and Bordoni, 2015; Wu, et al., 2014). Satarino, Scharlach and Lindeman (2014) claim that aging at home can reduce social exclusion because it increases the possibility of remaining in contact with one's family and friends and, consequently, also the possibility of being included in a larger community. But despite considerable advantages, there are also certain drawbacks which prevent a large-scale use of telecare systems, such as the costs, ethics, maintenance, training for use, connecting multiple systems, installation, and later problems with sub-optimal operation due to the thickness of the walls, acoustics, or lighting (Labonnote and Høyland, 2015; Piau, et al., 2013). Greenhalgh (2013), Mort (2013), Satariano (2014), and Vines (2013) et al. note that the elderly refrain from using telecare systems also because they do not want to be monitored or stigmatized. According to some interviewees, being a user of telecare systems means being old, dependent, ill, and generally unfit to live independently. Quite frequently, it is the non-users of a telecare system who fail to see its value. The use of telecare systems can also be problematic for people with impaired vision, hearing, or cognitive constraints (reaction time, perception of speed) (Satarino, Scharlach and Lindeman, 2014). In some elders new technology triggers anxiety and a feeling that they are not capable of handling the device on their own (Hall, Stellefson and Bernhardt, 2012). The in-depth studies report that on many occasions, elders have voiced their wishes for social support and assistance in learning to use the device (Aceros, Pols and Domènech, 2014; Sanders, et al., 2012; Saracchini, Catalina, and Bordoni, 2015). Therefore, it would be sensible to design a training programme to enable the elderly to use the telecare systems and thus reduce their feelings of anxiety (Hall, Stellefson, and Bernhardt, 2012). The elderly would use this technology if it were affordable, useful, and if they had access to the information on how to use it. Age and education also play an important role in the attitude towards telecare systems (Mostaghel, et al., 2016). Piau et al. (2013) believe that the elderly should participate already in the early stages of technical development and have the possibility to provide their feedback. This could reduce the gap between the experts' beliefs and end users' perceptions. Additionally, there are also contradictions between aging at home and active aging, because the majority of telecare technologies can only be used when the elderly lives at home or at the premises where the sensors are installed. In future, it would be sensible to develop systems that could also be used outdoors (Piene, et al., 2014). It is hard to determine what exactly the quality of life is. The World Health Organization (WHOQOL group, 1995) defines quality of life as “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”. This broad concept affects their “physical health,

psychological state, level of independence, social relationships, and their relationship to salient features of their environment" (Siegel and Dorner, 2017). The study on quality of life and acceptance of the technology by the elderly (Chou, et al., 2013) shows a statistically significant link between technology acceptance (perceived utility, user characteristics, and readiness for further use), and the social and environmental aspects of life. The authors claim that the elderly can benefit from telecare systems. They feel more secure because they can access information, obtain knowledge about their health, and have control of their medical conditions. Telecare systems can improve an individual's quality of life as they can provide a wide spectrum of functions associated with physical health, social inclusion, environmental factors, and psychological state (Siegel and Dorner, 2017).

It should be noted, however, that the studies analysed were carried out with a small sample size; hence, caution must be applied as the results may not be transferable to the entire elderly population. Additionally, ethnic minorities and elders belonging to lower economic classes were normally not included in the majority of studies. In future, similar studies should explore the possibilities to render telecare systems more affordable and, consequently, more accessible to the general elderly population.

Conclusion

One of the issues that emerges from the study findings is that despite good potential of the telecare systems, there are certain shortcomings. The latter are related to the elderly's skills in the use of such devices, finances, limitation of systems to a specific place, and the limited ability of the elderly to use modern technology. With the development of financially accessible telecommunication devices, which should be customized to individual needs, the elderly would be provided with the necessary technical and social support to live in their home environment. Such telecare system would contribute to a safer and more independent aging.

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Izvlečki

Abstracts

INTERREG PROJECT ITALIA- SLOVENIA: CROSSCARE

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Abstract

The idea of the Crosscare project evolved a few years ago from the necessity of exploring new ways of providing services to elderly people. My colleagues and I believe in person-centred care based on the evaluation of a person's specific needs in order to identify the best possible solutions.

Every person must feel free to choose his/her own "life project". When experiencing frailty, the decision whether to remain at home or to move to a nursing home depends on various factors, especially the support of their family members and the financial resources available.

Our purpose is to introduce a new "integrated approach" in order to meet the needs of the elderly where all resources could be useful in achieving the ultimate goal, which is to ensure a person's dignity. The partner regions participating in the project are Slovenia, Veneto and Friuli Venezia Giulia, who address similar problems and offer the same services to the elderly. The main difference is that the elderly citizens do not have the same financial means. We are developing an innovative model of integrated care for the elderly in order to support them in aging in place. The main goal is to educate family members to take care of their relatives and to identify a care manager who can decide the best solution for the elderly based on the integrated approach. At present, it is difficult to imagine that each elderly person can be assisted at home by a family member or by a personal care professional. Most families are unable to ensure the social and health care services an elderly person may need, this is why we are thinking of using home automation devices to implement our innovative model, such as specific sensors scanning elderly activity monitoring. The cost of the device of course should be sufficiently low to be available to the largest number of people possible.

We will use a skype technology, based on ordinary televisions, connecting people, friends, health and care professionals and family members and different technology based on the use of tablets.

While implementing our project, we will also use the so called "Polar Scheme" integrating 11 scientific evaluation scales, enabling all stakeholders to make a self-assessment of the outcomes in all aspects of people's life.

The over-all aim is to implement a cross-border model which can be applied in all partner regions: Slovenia as well as in Friuli Venezia Giulia and Veneto.

TELETRANSFUSION – THE BIGGEST TELEMEDICAL PROJECT IN SLOVENIA

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Abstract

Introduction: *While there are several telemedical projects in Slovenia, most of them are not put into practice, often not even moving beyond the developmental or pilot stage because no way can be found to fully implement them in the Slovenian health-care system. In order for telemedical projects to survive in the Slovenian health-care system, they should meet the following requirements: be professionally adequate, high-quality and economical. The biggest telemedical project in Slovenia, Teletransfusion [Teletransfuzija], satisfies all these conditions and is an example of good practice achieved, utilising local know-how.*

Methods: *The current state of telemedicine in Slovenia has been reviewed by collecting publicly accessible data on known telemedical projects in Slovenia. The projects were divided into two groups: active and non-active. Only active projects were examined in further research. The assessment was made on the basis of various criteria: operational regime, coverage of the Slovenian health-care system, type of telemedical services, extent of implementation, performance and years of operation.*

Results: *The section on results provides an overview of the current state of telemedicine in Slovenia, showing that Teletransfusion is the biggest telemedical project in the country. It is a national telemedical system that covers transfusion institutions supplying Slovenian hospitals, it operates 24/7 and has provided the greatest volume of telemedical services in terms of patient numbersfor twelve years. In addition, the development, implementation and operation of Teletransfusion system are presented. The positive effects of Teletransfusion on the uninterrupted operation of critical systems with regard to transfusion medicine, the quality of services, reliability, financial impact and information technology are highlighted.*

Discussion: *The development of telemedicine in Slovenia began in the 1990s. Few telemedical projects have managed to gain prominence in the Slovenian health-care system. While there is good technological potential, Slovenia is not as successful in implementing projects in the real environment, particularly in medicine. The combination of technology and medicine is known as telemedicine. Teletransfusion is an example of good practice that proves how a combination of appropriate technology, support among staff and management of an institution, and appropriate funding can make telemedical treatment better than the traditional provision of services.*

Key words*: telemedicine, Teletransfusion, transfusion medicine*

IMPACT OF E-HEALTH ON HEALTHCARE SERVICES

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Abstract

In the era of rapid digitalization, digitalization has found its way to everything – from home and personal devices to complex business systems. Healthcare, often considered as one of the oldest and most traditional systems, is not an exception. Today we are witnessing a growing awareness of the impact of modern technology in healthcare.

Recent investments in e-health by governments and other participants in healthcare ecosystem have resulted in increased quality of healthcare services in many areas. However, these are only the starting possibilities.

The examples of national e-health platform and few connected IT solutions, implemented in Slovenia and Croatia, may serve as an example of how IT solutions can increase efficiency of processes and services in healthcare viewed from the perspectives of patients, medical staff and the government.. An example of e-Referral and e-Appointments (e-Ordering) will demonstrate how these IT systems render ordering process much easier and faster for all stakeholders and how, for the first time, the patient is not only informed but becomes an active participant and user of national e-health platform. The cost-effectiveness and optimization of healthcare system will be presented by using some old IT solutions, such as SMS and by new "knowledge" based systems, like e-Guidelines.

Keywords: *e-health, e-appointments, e-referral, sms, e-Guidelines*

CHALLENGES AND OPPORTUNITIES POSED BY THE DIGITALISATION OF HEALTHCARE

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Abstract

Digitalisation is the future of the healthcare system. While this poses many challenges, it also creates opportunities that have an immense effect on the quality and safety of health care.

One of the challenges that is impossible to ignore is the fact that no strategic guidelines on digitalisation in healthcare exist. In addition, there are many versions and solutions in the background systems supporting information solutions, technical equipment is poor, many healthcare sector employees still do not use modern IC technologies, and processes are not adapted to the possibilities provided by digitalisation.

In addition to providing a more detailed presentation of the challenges posed by digitalisation in healthcare, the article addresses the many opportunities afforded by digitalisation for further developing the healthcare system and all its stakeholders. They can particularly benefit patients, and also healthcare providers, financial contributors and, naturally, system administrators, who, owing to digitalisation, can make decisions on the basis of reliable information and have a tool to evaluate achievements.

Key words: digitalisation in health care, challenges, opportunities

THE IMPORTANCE OF DIGITAL NARRATIVES IN "NAVIGATING KNOWLEDGE LANDSCAPES" TOWARD HEALTH

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Abstract

Introduction: *A personal view of health vs. illness is frequently an oversimplified binary approach driven by experience of acute diseases. An individual is either healthy or sick, should go to work or take a sick leave. Subsequently, in the context of chronic diseases, such a concept would imply everybody is sick and has to live, work and function in agreement with and embracing their own illness.*

Methods: *The interdisciplinary network on "navigating knowledge landscapes" was organized in order to understand how individuals search, find and use health-related knowledge in the digital society. This indicated a need to create a vocabulary and concepts, which would allow addressing the health and health-related values in the digital environment.*

Results: *Individual narratives indicate a personal approach to illness and personal quests toward health. Consequently, they allow an individual to reconstruct their own narratives, to show how to understand the illness, how to cope with disease, and how to find health. Health and illness are not binary opposites, nor do they represent a gradient of change from health toward illness with a grey zone in-between. Using narratives, the health as a concept uncouples from illness. Although connected, the health and illness emerge as distinct concepts, to be treated separately, allowing the narrative about the disease to have a healing power.*

Discussion: *In offline settings, the narratives were approached mostly through socializing and literature. In the online (digital) environment, the narratives take diversity of genres, they are shared across digital environment and rephrased/retold through social networks. As a result, the power of narratives increases and they are searched and used to "navigate knowledge landscapes" toward health.*

Keywords: *health, medical narratives, digital society, knowledge landscapes*

THE EFFECTS OF INCREASED SCREEN-TIME ON SLEEP QUALITY IN ADULTS AND CHILDREN

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Abstract

Introduction: *Sleep is essential to healthy development, and is required for both physical and mental health and well-being. Increased screen-time and sedentary behaviour is associated with decreases in sleep quality. The purpose of this review is to examine trends in sleep and sedentary behaviours (especially screen time) in the Slovenian population.*

Methods: *A review of literature describing increases in screen time and sedentary behaviour on sleep quality was conducted, with particular emphasis on Slovenian schoolchildren.*

Results: *Screen time has been shown to disrupt sleep and can displace physical activity for some people. Insufficient sleep can reduce physical activity levels in its own right; insufficient sleep is also associated with more screen time in children. In Slovenian schoolchildren specifically, screen time and sedentary behaviours are significantly increased on weekends compared to during school days, to an extent that the sedentary behaviour could negatively affect sleep quality, and certainly contribute to poor sleep hygiene.*

Discussion: *Future research should focus on establishing more concrete trends in the data between screen times and sedentary behaviours on sleep quality in the Slovenian population, especially amongst its youth. Integrating and publishing population data is essential to examine how screen time is affecting individual health and well-being in this rapidly growing research area.*

Keywords: *sleep quality, physical inactivity, sedentary behaviours*

MANUAL PERINEAL PROTECTION AND THE ROLE OF DIGITAL MEDIA AS A TRAINING TOOL

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Abstract

Lateralisation of episiotomy, slowing of the expulsion of the faetal head, and manual perineal protection (MPP) represent important set of preventive interventions for avoiding obstetric anal sphincter injuries (OASIS) (Kalis et al., 2016). Until now, three techniques of MPP have been described: 1) hands-on: perineal protection during crowning of the foetal head (when perineum is stretched); 2) hands-poised: perineal protection only in the case of imminent (severe) perineal tear; 3) hands-off: no use of perineal protection in labour (Prka et al., 2015). According to the most recent Cochrane Database review, hands-off (or poised) compared to hands-on technique makes no clear difference in the incidence of intact perineum, as well as OASIS (Aasheim et al., 2017). Very recently, an animation-based hands-on technique training video was proposed as a teaching modality for obstetricians and midwives (Ali et al., 2017).

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DIGITALIZATION IN CLINICAL RESEARCH – WE ARE STILL AT THE BEGINNING

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Abstract

Thorough documentation is one of the key factors for successful clinical research. A large number of these documentation processes, including the written informed consent of study participants or the collection of clinical study data is still paper-based. Entering those data into electronic databases is time consuming, subject to transcription errors and outdated. Novel approaches for the digitalization of informed consent, direct digital clinical data capturing are still in the early stages and need to be widely implemented.

Another important topic in clinical research is the recruiting the prespecified patient population within the defined time period, which is vital for the success of a clinical trial. However, recent analyses demonstrate that approximately 1 out of 3 clinical trials fails to meet the recruitment targets, leaving the trial often with a too small sample size to draw scientifically justified conclusions. Analyses of the reasons for this finding show that lack of time within routine clinical care and lack of staff training are the main barriers for clinicians to recruit trial participants more efficiently. Therefore, clinical sites and pharmaceutical industry jointly look for ways to overcome this critical hurdle in clinical trial performance.

While electronic health record-based trial alerts to physicians have demonstrated to enhance trial recruitment, this approach is not yet widely used and not technically implemented at most trial sites.

Within joint research activities of the Medical University of Graz and the Center for Biomarker Research in Medicine together with IT-industry partner, novel tools are being developed to further digitalization in future clinical research.

SMART AND HEALTHY: ON INNOVATIONS AND PROGRAMING THE FUTURE

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Abstract

Introduction: *The closeness of software and medical practice has never been more intense than today. In practice, numerous and diverse attempts of introducing technological innovations and synchronisation of digitalisation into medical and health arena can be observed. Over the last 20 years of intense development of the so-called digital health and the predominant techno-utopian ideology of digitalization and informatisation in healthcare, it has become evident that a number of unexpected consequences and obstacles are arising.*

Methods: *The author will present the selected results of anthropological research conducted in the context of postdoctoral research project Health in your pocket and on the internet (financed by the Slovenian Research Agency). From January 2016 to December 2017, the author closely observed and analysed the social dynamics that is being created by the process of digitalisation and informatisation in health sphere in Slovenia.*

The researcher's perspective of new technologies and the digitalisation is holistic, whereas "everything on-line" is only a fragment in our everyday complex navigation between multiple modalities. Besides literature and sources review and analysis, the attendance at scientific, professional and artistic events on the digital health, the main strengths of the research are fieldwork: participant observation and 30 in-depth interviews with medical doctors, users/patients and IT developers.

Results: *Algorithms are not objective neither neutral mechanisms (see Ziewitz 2016; Boellstorff, Maurer 2015). Chun (2011) elaborates on the logic of the programmed future in the context of new media. Similarly, contemporary medicine and diverse self-tracking practices are more and more »governed« by the algorithms that set priorities, norms, and impose a pre-chosen logic of thinking and acting. Algorithms create predefined versions of social realities. The main aim of the presentation is to give an argumentation how we can think about the future of health, medicine, healthcare in this historical moment of ubiquitous social ideology of technological progress and technological fix, where software gained the power in medical and health contexts as well. Empirical data revealing the voices of medical doctors, users and IT developers will be presented.*

Discussion: *The presentation is a contribution to a better understanding of the relational and ontological complexity of socio-cultural infrastructures enacted by introducing the digital and new technologies in health care sphere.*

Key words*: digital health, digital medicine, programming future, algorithms, software.*

Plenary paper

A NEW WORLD OF LEARNING • EUROPE 2020 • CLINICAL MEDICINE AT THE GLANCE

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Abstract

In the first part of the lecture, the author addresses the dynamic changes of the last two decades induced by globalization and IT revolution in the wider social context, leading to changes in the segment of education and (clinical) medicine. It also explains the differences and the consequences of moving from the industrial age to the information age, or the difference between strategic thinking in relation to strategic planning. In the second part of the lecture, the author explicitly cites specific differences in the thinking and understanding of clinical medicine and education between the industrial and information era. The last part of the lecture highlights the need for rethinking, redesigning and restructuring the entire education process in all segments of clinical medicine and for all health profiles. It especially emphasizes the importance of changing education to facilitate acquisition of new and different student competences, such as critical evaluation, transformation and synthesis of new knowledge and general and specific communication skills.

KAZALO AVTORJEV PRISPEVKOV / CONTENT OF ALL COMPLETE PAPER AUTHORS

Imena vseh avtorjev po abecedi
Names of all authors in alphabetical order

KAZALO AVTORJEV IZVLEČKOV / CONTENT OF ALL ABSTRACT AUTHORS

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