

DIGITAL TECHNOLOGIES AS SUPPORT TO HEALTHCARE SYSTEMS IN PROMOTION OF HEALTH AND PREVENTION OF DISEASE: RAISING AWARENESS AS AN AIM OF COMMUNICATIONS

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The paper analyzes the approach to one very important phenomenon in the modern environment, which is defined as digital transformation in the healthcare system. The increasing influx of digital technologies into business processes leads to the point where the provision of healthcare services can no longer be viewed only in traditional frameworks, but it is necessary to look at the unlimited options of digital technologies, digital content and digital communications in the provision of healthcare services.

The needs of the healthcare system and certain changes resulting from the development of communication and information technologies such as the Internet, social networks, mobile applications, etc. require organized work on the implementation of a strategy for new ways of doing business in healthcare. Health information and early screening awareness of oncological diseases increase the motivation for active participation of people in the implementation of preventive measures, treatments and rehabilitation.

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Introduction

With the development of new communication technologies, satellites for communication and Internet connectivity, spatial distance and time are no longer obstacles, the boundaries of national states are being overcome and the world is becoming a "global village" (1). Information flow, connectivity and networking are significant features of the new, reshaped world

(2). The process of globalization itself is often viewed only through the basic aspect: economy–profit–capital (3). A significant determinant of a nation's ability to be successful on the path of global progress is the preservation of people's health (4). The healthcare systems of developed countries, on the basis of their development strategy, highlight the essence of prevention in preserving human health by identifying factors of risk and promoting activities to eliminate them. Medicine, as a humanistic science, has always based its development on the exchange of research experiences and the finding of new diagnostic and therapeutic procedures so that they would be available to humanity in a very short time. This requires the constant development of digital technologies, ensuring their availability as well as strengthening the connections between doctors in order to respond to the global market and ensure healthcare knows no borders.

At this point, it is necessary to point out the importance of digital medicine (5–8). Namely, this new digital age of medicine indicates the use of digital tools in medical practice, at the core of which is the development of technological solutions for monitoring, processing and integrating huge amounts of data at the individual and population level to help solve health problems and challenges faced by patients, clinicians and health systems.

The essence of its operation is focused on caring and empowering patients to take charge of their health, thereby emphasizing true prevention, while at the same time helping clinicians manage the increasing volume and complexity of patient data in a cost-effective and time-saving manner (6).

The subject of research in this paper is the review and analysis of the role of digital communications in health promotion, with a special focus on information about oncological diseases. It should be emphasized that digital communication is a phenomenon of modern society (9), and the basis is the rapid exchange of information and the interaction of people in real-time (10). It represents any exchange of data in digital form, which allows people to connect and communicate with each other (11). The paper defines the options for improving health activities in order to better inform people and raise awareness about the prevention and early screening of oncological diseases.

Methodological Concept: Instrument and Research Results

This research used the questionnaire named *Questionnaire on Digital Communications in the Prevention of Oncological Diseases* which contains 25 questions and comprises many sections (12-13). The questionnaire is distributed on the social network Facebook to the respondents. In addition to descriptive statistics, statistical analyzes of testing, primary and secondary materials were also used.

The research was conducted on a sample of 150 respondents of both sexes chosen by the random selection method. The analysis was carried out in the period from September to December 2019 in the form of a cross-sectional study. The sample was stratified by:

- gender (male-female)
- age (≤ 29 ; 30 to 39; 40 to 59; ≥ 60)
- education (without education, primary school, secondary school, faculty)
- marital status (married, divorced, widower/widow, single).

Respondents of both genders participated in the research, 81 respondents (54%) were female and 69 respondents (46%) were male. There was no significant difference in gender distribution between respondents. According to age, 52 respondents (35%) were younger than 29 years old, 9 respondents (26%) were between 30 and 39 years old, 26 respondents (17%) were 40 to 49 years old, 15 respondents (10%) were 50 to 59 years old, while 18 respondents (12%) were over 60 years old. If we take into account that the questionnaire was distributed on the Facebook page and that this network is mostly followed by younger people, it can be noted that 61% of respondents were under 40. According to the *Pew Research Center's report*, 62% of all online men and 72% of all online women use Facebook (14).

The greater presence of the female population can be explained by the existence of a large number of contents that are in the sphere of activity and interest of women, as well as the presence of numerous ongoing obligations related to work, home, children—which require quick execution. In such an environment, women looking for quick and useful advice and information use the Internet and various other types of social networks significantly more. The largest number of respondents, 63 of them (43%) were married, 53 respondents (37%) were single, 23 respondents (14%) were divorced, and 9 respondents (6%) were widowed. According to previous reports, marital status is not a parameter for monitoring presence on social networks. However, in today's busy life with little free time and increasing alienation of people, it is a realistic assumption that those who live alone use social networks more often. According to the level of education, 88 respondents (59%) had secondary education, 38 respondents (25%) graduated from faculty, 19 respondents (13%) completed primary school, and 5 respondents (3%) had no education. Referring again to the *Pew Research Center's report*, 60% of adults with secondary degree or less use Facebook, 71% of users hold a college degree, and 77% of users hold a university degree (9). Life in the modern world is a fast-paced, full of obligations, with the need for quick contacts and information, and access to the Internet from a mobile phone offers unlimited possibilities. Easy handling, which does not require special knowledge, is one of the reasons why more and more elderly people are becoming users of social networks.

In the following paragraphs, we will look at an analysis related to the assessment of general health, performed screening and received information about malignant diseases.

Information about malignant diseases was received by 76 respondents (50.7%), 12 respondents (8%) were never informed, while 62 respondents (41.3%) were not sure if they had ever received information. This can be explained by possible unreliable sources of information when respondents were not sure of the accuracy of information about malignant diseases and whether they could be considered information at all.

It was revealed that 114 respondents (76%) had never undergone screening for any oncological condition, while 31 respondents (21%) were not sure whether the tests they had undergone previously were part of cancer screening. Only 5 respondents (3%) had undergone some kind of screening for the detection of oncological conditions in the past. Screening represents the recognition of a previously undetected disease, using a screening test in a seemingly healthy, i.e., asymptomatic target population. The goal of breast cancer screening is to reduce mortality, while with organized cervical and colon cancer screening, both incidence and mortality are reduced.

Screening methods should be highly sensitive, specific and easy to apply. Early detection of cervical cancer can be done through a cytological smear of the cervix (Pap test), for early detection of colon cancer, it is recommended to undergo an immunochemical test for occult bleeding in the stool and colonoscopy, and for early detection of breast cancer, mammography is the recommended procedure. Screening is a complex process that requires the use of several factors: the functioning of the call system, media companies aimed at the target population, the development of recommendations for doctors and other medical personnel, patient consent, sufficient financial resources and the selection of an appropriate test. According to the recommendations of the European Commission, the acceptable level of population participation in screening is 45%, and the desirable level is 65%. The screening will have the maximum effect if it is carried out as part of an organized program for

the target group, which gives social networks an exceptional advantage in the promotion of planned actions (8).

The subjective assessment of the respondents' health on an ordinal Likert scale from 1 to 10, indicated that the largest number of respondents, 62 of them (41%) evaluated their health as excellent (10), 25 respondents (17%) with a score of 9, 11 respondents (7%) with a score of 8, 23 respondents (15%) with a score of 7, 19 respondents (13%) with a score of 6 and 10 respondents (7%) with a score of 5 (neither good nor bad). There were no respondents with a subjective assessment of health from 1 to 4. Taking into account that most of the respondents in the survey were under 40 years of age, we can assume that the most common assessment of general health was excellent/good in accordance with their age (Figure 1).

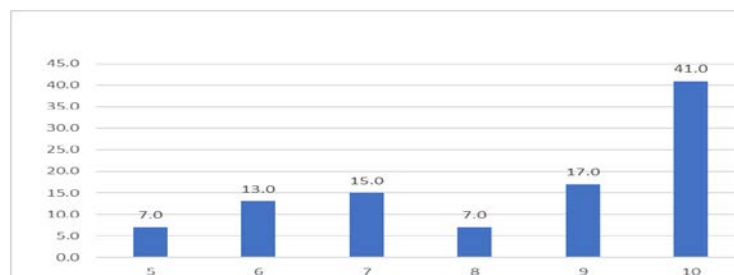


Figure 1. Subjective assessment of health

(Figure taken from Sinanovic (12))

About 44% of respondents believed that they were at no risk of contracting cancer, while only 15% of them (22 respondents) were absolutely certain that they had no predisposing factors for contracting cancer (Likert scale scores 1, 2, 3, 4, 5). Forty respondents (26%) had a low risk or suspected that there was a possibility of contracting malignant diseases (ratings on the Likert scale 6 and 7), while 24 respondents (16%) believed that there was a more pronounced risk of the disease (ratings on the Likert scale 8 and 9). In assessing the risk of the occurrence of malignant diseases in the future, there was a great risk and anxiety in 11 respondents (7%), probably because of already existing problems or family burden.

A larger number of them, 76 respondents (51%) were informed about malignant diseases from written sources, 62 respondents (41%) were not sure that they received information in written form. A small number of them, 12 respondents (8%) had never received information about malignant diseases in written form. The most common source of information about malignant diseases was the Internet for 58 respondents (38%), television for 36 respondents (24%), while

only 24 (16%) respondents received information from a doctor. Professional magazines and educational courses were mentioned by 25 respondents (17%) as a source of information about oncological diseases, which we can assume are professionally or educationally related to medicine. Only 8 respondents (5.3%) were not informed about malignant diseases. The Internet is increasingly used as a key source of information about malignancies among the general public, patients, and caregivers. Approximately 90% of the population regularly accesses the Internet in Europe, North America and Japan (13). Websites are one of the main sources of cancer information in Japan.

Providing information about cancer on social networks has several advantages, e.g. the internet provides quick and easy access to cancer information and information seekers can seek advice anonymously. These benefits of information can enable them to increase their knowledge and ability to actively participate in making personal healthcare decisions (14).

Electronic communication between patients and doctors is currently developed in many rich and better organized healthcare systems. This is

why the Internet is a valuable platform for oncology education, although its usage implies the existence of potential threats. Electronic sources for the mass dissemination of useful oncology content often face the potential dissemination of unwanted, uncontrolled and sometimes harmful information. Currently, blogs and social networks are used significantly more for sharing experiences about treatment, disease courses, diagnostic procedures and emotional support, and less for the dissemination of scientific oncology information (15).

Serbia is the first country in Europe in terms of the death rate from cancer, and the rate increases annually by an average of 2.5%, which indicates that the problem of malignant tumours is very serious in our country. Every year, some form of malignancy is discovered in about 33,000 people and about 21,000 people die from this disease. Breast, colon and cervical cancer are the most common among women, and that is the reason why we are "among the leading European countries". As for men, they most often suffer and die from lung, prostate and colon cancer. Considering the obvious increase in cancer patients, it is necessary to educate people about early recognition of cancer symptoms, as well as risk factors (12).

Respondents seem to have insufficient understanding of the seriousness of malignant diseases so that 75 respondents (50%) believed that they needed more information about malignant diseases, 32 respondents (21%) did not want more information, while 49 respondents (29%) were not sure whether they had the necessary information about oncological conditions. So far the research has shown that only five to ten percent of cancers are hereditary. This means that non-inherited causes of cancer—lifestyle choices, food and fitness levels have a direct impact on overall cancer risk. Organized education programs should encourage people of all age groups to take care of their health by changing their lifestyle and diet, conducting check-ups, preventive examinations and monitoring their health status in order to detect any changes that should be consulted with medical experts. In these health promotion activities, digital technologies take precedence: the Internet and numerous social networks because they connect millions of users. According to the data obtained from this research on social media usage, all respondents used the Internet. Among the respondents who used social networks, 70 of them (46%) used Facebook, 46 respondents (31%) used WhatsApp, and 34 respondents (23%) used Twitter. Most of the respondents, 119 of them (79%) accessed social networks several times during the day, 12 respondents (8%) accessed them once a day, while 6 respondents (4%) accessed them once a week. Only 13 respondents (9%) did not use social networks at all. Such data on the number of the Internet accesses do not deviate from some research in more developed European countries

and the explanation is direct (without the need to log in), easy and fast access via mobile phones and its applications.

The rich content and many innovations of the Internet have particularly attracted the young population, and as a result of this situation, the frequency of using the Internet and social networks has increased significantly, while it should be emphasized that an increasing number of older users are appearing (12). Dissatisfaction with the state of healthcare in our country leads people to increasingly Google the symptoms they have in the hope of getting an explanation for their ailments. They often "consult" the Internet even before they decide to go to the doctor. On various forums you can meet people who compare the symptoms they have, they often tend to self-diagnose, which in some cases can be disastrous for the prognosis and outcome of the disease. Real and meaningful information about health should motivate people to visit a doctor and consult about their ailments. According to the research, only 52 respondents (35%) received information about health on WhatsApp, 52 respondents (35%) sometimes received health information on this platform, and 46 respondents (30%) did not use this network for health topics. Sixty-three respondents (42%) received information about health on Facebook, 54 respondents (36%) sometimes received health information on this platform, while 33 respondents (22%) did not use this network to review health topics. Twitter, in contrast to other social networks for receiving and exchanging information about health and diseases, was used by 23 respondents (15%), 41 respondents (27%) sometimes received health information on Twitter, while 58% of respondents did not use this network for health-related information or communication. Most often, this network is used to communicate about current political and social topics and significantly less about health and diseases. It should be emphasized, however, that Twitter is a very popular social network in European countries, the leading source of content related to health, so that people can get real-time answers to numerous health-related questions and concerns or symptoms that they experience and want to address about. Many Twitter accounts specialize in certain diseases: diabetes, kidney diseases, depression, heart diseases and many others where one can often get expert health advice.

Our research went a step further, so it emphasized the examination of the influence of messages from social networks on treatment decisions. Thus, the influence of information on social media about health and diseases on decision-making about the method of treatment was present in 45 respondents (30%) while a large number of respondents, 80 of them (53%) sometimes made decisions about health or disease treatment based on information received from social networks. On the other hand, the

information did not influence the attitude of 25 respondents (17%) towards treatment.

Frequent and long-term use of social networks can lead to isolation and exclusion from social activities. Life in the virtual world becomes the only real one, and hundreds of information that are received, without even thinking about them, become the only truth (9). As a result of unreserved trust in information and advice, lack of verification and validity of information and some errors in people's actions can often occur with serious health consequences. Postponement of going to the doctor, incorrect interpretation of symptoms and a mix of multiple therapies from the Internet are often the reason for emergency hospitalizations. It is important for people to be informed about health or diseases in order to take an active role in protecting or maintaining their health as well as treatment, but it is necessary to consult with their doctor about the information from social networks that has left an impression on them.

Information on whether and to what extent health information from social media is checked, suggests that only 37 respondents (25%) checked their accuracy in a conversation with a healthcare professional, 32 respondents (21%) checked their accuracy sometimes, while 81 respondents (54%) did not check the accuracy of the posted information. Frequently, the reason for this lies in the large number of paramedical articles or comments, which, on the other hand, can lead to a bad attitude towards health. It is also noted that based on publications about health, methods of treatment or preparations recommended for treatment, 42 respondents (30%) started self-medication without consulting a doctor, 83 respondents (53%) did it sometimes, while 25 respondents (17%) did not undertake independently treatment or did not accept information without expert consultation. Additional information according to the respondents was that 47 of them (32%) received the best information about health on Facebook, 39 respondents (25%) received the best health-related information on YouTube, 29 respondents (20%) received it on Google, while only 14 respondents (9%) presented WhatsApp as a social network with good health information. Published scientific papers and works of signed authors can be read after retrieving through Google search, which justifies the veracity of the information and instills confidence. By the way, YouTube is known for its video displays that provide real-time information from experts in various fields and the existence of the possibility of contact makes this social network acceptable and the information obtained reliable.

Visiting the health forums can provide additional information on a particular topic. Our research showed that 65 respondents (43%) regularly visited health forums, while 48 respondents (32%) visited them occasionally. These forums are great for sharing similar experiences, providing support, and publishing

actions, experiences and opinions of people on a given topic. In contrast, only 37 respondents (25%) did not visit health forums at all. It should be emphasized that the forums also provide professional advice because a large number of people comment based on experiences or previously acquired verified information and knowledge. In fact, forums have a professional character, with reliable information because they are organized by health workers from a certain speciality. Internet users often look for disease-specific information that will enable them to recognize a particular health problem or confirm that diagnostic and treatment measures are correct. Certainly, one way to improve the health of Internet users is to encourage them to turn to known and trusted websites when looking for health information. Forums provide insight into the experiences of others, but information from forums can be combined with information on health websites developed and controlled by experts, which can help make informed medical decisions for personal health or the health of loved ones. The importance of sharing experiences about health problems on social networks also has a big impact on health. Visitors who attend forums about some health problems feel the sincerity in the group, support and engagement in order to solve the problem. For that reason, in our research, 70 respondents (47%) stated that the experiences and recommendations of people with similar health problems meant something to them, 26 respondents (17%) stated that occasionally that kind of support meant something to them, while 54 respondents (36%) did not experience the forum in that way and the information they received there did not mean anything to them. Certainly, forums run by health professionals are significantly more visited and provide reliable guidance about health or illness, but the experiences of people who survive health problems and undergo therapeutic procedures can be significant emotional support for patients or family members. It was also observed that in the context of needs and desires related to healthcare, the largest number of respondents, 68 of them (46%) wished to consult with a medical expert online from home, in peace. Similarly, 71 respondents (47%) wished to establish online contact with a doctor in case of any medical need, indicating their trust in doctors as providers of professional information. However, 11 respondents (7%) did not think that online contact with a doctor would satisfy their healthcare needs. A larger number of respondents, 86 of them (57%) were interested in contacting a doctor by phone in case of any health issues. Additionally, 45 respondents (30%) occasionally needed to contact a doctor in case of real needs or uncertainty regarding the treatment of health problems, while 13% believed that they did not need a contact in this way because they probably support personal contact with a doctor. Further, 74 respondents (49%) had health applications

installed on their mobile phones, while 76 respondents (51%) did not have any such application, which indicates insufficient knowledge of the content and possibilities of health applications. Of course, the choice of social networks and applications mainly depends on the mobile device that is being used at that moment. Applications created exclusively for mobile phones are on the rise and social connections use all the advantages of smartphones, such as GPS, cameras, speed and constant internet connection. Although at the moment the impact of these applications is not great, thanks to innovative configurations and mass acceptance, applications are becoming an integral part of people's daily lives. A mobile application that aims to maintain and encourage a healthy lifestyle and is not related to the diagnosis, prevention or treatment of disease cannot be considered a medical device (12). Therefore, mobile applications help people to improve their health behavior, motivate them with positive changes and above all risk factors (obesity, excessive caloric intake, physical inactivity...) gain an important place in providing important health information and raising awareness about a healthy lifestyle.

Although they placed the greatest trust in the doctor as a reliable source of professional information, 87 respondents (58%) believed that their health centre was not capable of providing them with the necessary health information, 39 respondents (26%) believed that they occasionally received the required information, while only 24 respondents (16%) believed that they could obtain the necessary health information there. Patient autonomy, as one of the basic postulates of medical ethics, enables patients to make their own decisions regarding medical treatment based on their knowledge. To make that decision, patients must have access to all relevant information about their condition and all options for treatment. For that reason, doctors help the patient in making a decision with timely and truthful information about risk factors, the nature of the disease, possible consequences, available treatment, as well as possible positive and/or negative outcomes or risks of treatment. Informing patients is one of the standards of ethical behaviour (16), which is expected from doctors and other medical personnel in their daily work with patients. In this way, the medical profession proves that it respects the rights of the patient and his autonomy, which enables each user of health services to freely choose a doctor based on the information received, accept or reject the advice or proposed treatment, and make their own decisions about medical treatment and procedures.

Discussion

The increasing influx of digital technologies into business processes leads to the point where the provision of health services can no longer be viewed only in traditional frameworks, but it is

necessary to look at the unlimited possibilities of digital technologies, digital content and digital communications in the provision of healthcare services. The traditional way of providing health services with the implementation of digital technologies provides great opportunities in the exchange of knowledge and information between health workers, health associates and patients, increases the accessibility of expert consultations, actively involves patients in the process of diagnosis and treatment, and above all, provides enormous opportunities for preventive action in the preservation of health.

Digital technologies are changing the way of connecting users of healthcare services in terms of realizing the possibility of establishing two-way communication with healthcare professionals in real-time and any place. A number of healthcare systems dealing with the analysis of patients' needs and demands have identified information technologies as key elements to improve the quality of healthcare. There is evidence that digital communication with healthcare providers improves the quality of health (17,18) and that healthcare consumers would benefit from increased partnerships between health information technology and healthcare providers.

The concept of digital strategy in the healthcare system focuses on the collection of necessary epidemiological information, information on the incidence, prevalence and mortality of certain diseases, risk factors, and availability of medical experts with the formation of a sub-strategy of digital business, primarily Web and mobile strategies, to organize e-health and m-health, with emphasis to social networks and their capacity to connect people and quickly spread information (19).

Based on the results of the research, we can draw some significant conclusions. The obtained results clearly indicate that digital technologies in the healthcare system are necessary in order to raise awareness about oncological diseases, increase the information of the population and prevent malignant diseases. Another advantage is that the Internet allows us to access health information and healthcare services in any geographical area, which leads to the internationalization of healthcare (20). The Internet in a very fast and cheap way ensures communication with the whole world allowing for quick identification of the target e-health services. At the same time, it enables effective communication at the patient's request. What social media provides us is real-time information (21) from various health experts and the exchange of patients' experiences. In such conditions, it was noticed that users recognize e-health and m-health as a new type of promotion on prevention, early diagnosis and treatment of oncological diseases. Research has shown that the information provided to cancer patients means a lot in the treatment process, but their information needs are still not met (22). In addition, the research showed that social networks with numerous contents about health represented a

very effective way of healthcare promotion and disease prevention. Mobile applications help the promotion and control of a healthy lifestyle while forums represent an important form of communication for groups of users, providing professional, experiential and emotional support for a specific medical problem. In the context of the obtained research, there are also numerous studies, which show that about 60% of doctors have increased their interaction with patients via the Internet using social media (Twitter and Facebook) in order to educate patients, monitor their health, and encourage them to change their lifestyle with the hope that those efforts lead to better health education, greater compliance and better outcomes (23). Information and the dissemination of the latest knowledge have become an important element of business functioning as well as the satisfaction of many life needs of modern man.

All the findings suggest that social media indeed enable healthcare institutions to get closer to their users, share information on health policy and practice issues, promote health behaviors, interact with the public, educate and motivate patients to take an active role in their treatment and provide meaningful health information to the community (24).

Conclusion

The paper analyzes the approach to one very important phenomenon in the modern environment, which we define as digital transformation in the healthcare system. It is certainly necessary to point out that when it comes to receiving information from a doctor

through some form of digital communication, the doctor-patient relationship becomes an extremely complex process that requires the education of health workers, with the goal of proper information exchange.

Healthcare workers are a source of health information that patients trust more than the Internet, but due to the availability and speed of obtaining information, the Internet is the source most often used by the public to quickly find health information in order to be informed. If health services become available to everyone to the same extent, they restore trust in the healthcare system and by providing expert information to people, they open up enormous opportunities to work on the prevention of many diseases. Although it has been observed that users recognize e-health and m-health as a new form of promotion for the prevention, early diagnosis and treatment of oncological diseases, and that the information provided to cancer patients means a lot in the treatment process, their needs for information are still not satisfied. However, based on all the results obtained, it was determined that digital technologies in the health system are necessary in order to raise awareness about oncological diseases, increase the information of the population and prevent malignant diseases. One of the advantages is that the Internet allows us to access health information and health services in any geographical area.

Informing and disseminating the latest knowledge have become an important element of business functioning, but also the satisfaction of many life needs of modern man.

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DIGITALNE TEHNOLOGIJE KAO PODRŠKA ZDRAVSTVENIM SISTEMIMA U PROMOCIJI ZDRAVLJA I PREVENCIJI BOLESTI

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U radu se analizira pristup veoma važnom fenomenu u savremenom okruženju koji se definiše kao digitalna transformacija u zdravstvenom sistemu. Sve veći upliv digitalnih tehnologija u poslovne procese dovodi do toga da se pružanje zdravstvenih usluga više ne može posmatrati samo u tradicionalnim okvirima već je neophodno sagledati i neograničene mogućnosti digitalnih tehnologija, digitalnih sadržaja i digitalnih komunikacija u pružanju zdravstvenih usluga. Potrebe zdravstvenog sistema i promene koje nastaju razvojem komunikacionih i informacionih tehnologija poput interneta, društvenih mreža, mobilnih aplikacija i sl. zahtevaju organizovan rad na sprovođenju strategije za implementiranje novih načina poslovanja u zdravstvu. Informisanost o zdravlju i podizanje svesti o ranom skriningu onkoloških bolesti povećavaju motivisanost za aktivno učešće u sprovođenju preventivnih mera, lečenju i rehabilitaciji.

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Ključne reči: digitalna komunikacija, društvene mreže, e-zdravlje, m-zdravlje, onkološke bolesti

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