Trends in socio-technological impact of information technologies on the discourse of healthcare actors

Yu M Tokareva¹, V M Chizhova¹, Kardash O I¹, Gavrilova I S¹ and Y Varavkina¹

¹ Volgograd State Medical University, 1, Pl. Pavshikh Bortsov Square, Volgograd, 400131, Russia

E-mail: kazachkova.djulia@yandex.ru

Abstract. The integration process of information technologies and medicine has led to the formation of cyberspace. As a result of the research, the factors of positive and negative socio-technological impact of information technologies on the discourse of health care actors were identified. Positive impact factors include the possibility of continuing medical education, reduced time spent on virtual consultations, the possibility of creating social networks, communication, and the availability of specialized medical information to patients. Negative impact factors: the problem of self-diagnosis and self-treatment, the possibility of patients receiving incorrect information on the Internet, ineffective diagnostics in virtual consultation, and patients’ distrust of the health care system.

1. Introduction
In modern society, the processes of informatization affect almost all areas of professional and everyday activities. Modern life is impossible to imagine without the Internet. Many areas of specialized knowledge are integrated with computer science. Medicine is no exception. The process of integrating medical knowledge and the Internet leads to a cultural transformation of traditional relations in the health system and qualitative changes in the field of health protection and promotion. In the era of the information society, medicine and the healthcare system have great prospects. Cyberspace as a space of interaction formed by a global network of computers that make up the Internet, allows for remote medical consultation of patients, contributes to the formation of virtual medical communities, etc.

E-health is a new field of medical practice formed at the intersection of medical Informatics, healthcare and business. Cybermedicine is the study of the use of the Internet and global network technologies in medicine and public health. The main tasks of cybermedicine are to study the possibilities and limitations of using the Internet in medical practice. Thus, the concept of e-health reflects the field of practice, while cybermedicine is a field of knowledge. In Russian science, the term "telemedicine" is used, which is defined as a branch of medicine that uses telecommunications and electronic information (computer) technologies to provide medical care and health services at the point of need (in cases where geographical distance is a critical factor). The question arises about the relationship between the concepts of "cybermedicine"and "telemedicine". Not to say that it is synonymous. In the case of telemedicine, the Internet is considered as a means of communication and exchange of clinical and rather confidential information between a limited number of participants (for example, a doctor and a patient, doctors). For cybermedicine, the Internet is a field of activity in virtual reality, in which interaction is carried out on the basis of a global exchange of open information, not always of a clinical nature, both between patient and doctor, doctor and doctor, and between patients. Conflicting interpretations arise, in our opinion, due to differences in the pace of Informatization in countries [1-10].

2. Materials and methods
The basis of an independent author's empirical study was a survey (questionnaire) of second-year clinical residents of Volgograd state medical University (2019). The sample size was 453 respondents. The reliability of the results is ensured by the representativeness of the sample and empirical material. The analysis of factors was carried out in two main groups: factors of positive impact of information technologies on health care actors; factors of negative impact of information technologies on health care actors.

**Table 1.** Classification of factors of socio-technological impact of the Internet on the discourse of health actors.

| Factors of positive impact of information technology on health actors | Possibility of continuing medical education |
|---|---|
| | Reduce time spent on virtual consulting |
| | Possibility of forming social networks, communication |
| | Accessibility of specialized medical information to patients |

| Factors of negative impact of information technology on health actors | Problem of self-diagnosis and self-treatment |
|---|---|
| | Possibility of patients receiving incorrect information on the Internet |
| | Ineffective diagnostics in virtual consulting |
| | Patients’ distrust of healthcare system |

3. Results

As a result of the research, we were able to identify positive and negative trends in the socio-technological impact of information technologies on the discourse of health actors.

The most significant factor of positive impact is the opportunity to get information about the latest developments and continuous distance education. In order to learn about new medications or ways to treat a particular disease, the doctor does not need to spend a lot of time in the library. All the information you need can be obtained via Internet services. You can improve your professional level without interrupting your work.

**Figure 1.** Factors of positive impact of information technology on health actors

Virtual consulting allows you to reduce time spent. In order to consult with a cyberdoctor, there is no need to face the organizational problems of medical institutions (making an appointment with a specialist, waiting lists, waiting for an appointment, etc.). Another advantage is the ability to contact a
specialist anonymously via the Internet. The patient's shyness or social censure of a particular behavior can sometimes prevent timely access to a specialist.

The positive side of using the Internet in medical activities is the possibility of forming social networks and communication. This applies to both the doctor and the patient. Social networks allow doctors to communicate with each other, discuss professional issues, exchange experience, keep up to date with the latest scientific developments, etc.

For patients without medical education, the Internet is also an open source of specialized medical information.

Symptoms, diseases and ways to treat them, medications, prevention methods, basics of a healthy lifestyle, etc. You can get this information without visiting a doctor. But it is one thing when a specialist receives this information and evaluates it from the point of view of their knowledge and experience, and another thing when this information is used in practice by people who do not have special education. There is a risk of inadequate assessment and application of information, including self-diagnosis and self-treatment.

Figure 2. Factors of negative impact of the information technology on health actors.

Currently, the problem is to maintain the trust of so-called Internet-savvy patients in conditions of free access to specialized medical information.

According to the respondents, this is an urgent problem for the national health care system, given that the time allotted for patient appointments is limited and the doctor is not always able to provide detailed information of interest to the patient.

On the other hand, the fact that patients have access to the same knowledge bases as doctors leads to an increase in consumer knowledge and encourages doctors to set higher quality standards.

Clinical residents note that the quality of medical information on the Internet varies from the most up-to-date and scientifically based practical recommendations developed by leading groups and associations of experts in various fields of medicine, to information that is absolutely incorrect, frankly outdated, and even dangerous.

The disadvantages of virtual counseling include the problem of the reliability of the diagnosis and the appointment of appropriate therapy, based only on the text of the patient's email. From this point of view, we see that medical online consultations carry a considerable risk to the patient's health. Help may not be appropriate for the disease, moreover, it may not be provided in a timely manner. This suggests that online medical counseling can not be considered an alternative to face-to-face appointment of a specialist. It is quite difficult to establish the qualifications of a cyberdoctor. There is a risk that the patient will be recommended by a specialist who is incompetent in a particular area.
This problem is solved with the help of virtual offices of cyberdoctors, where you can get all the information you need about this specialist, up to a copy of the education document. However, not all sites have such services [11-21].

4. Conclusion
Cyberspace allows health system agents to interact in the new reality field. New information networks contribute to changing medicine and healthcare in two ways:

1. Electronic medicine (E-medicine). The Internet contributes to increasing the effectiveness of traditional forms of diagnosis and therapy within this phenomenon. The use of new forms of control improves the quality of care. E-medicine opens up prospects for the development of new forms of educational and research activities.

2. E-health, in which interaction takes place among a wider range of agents. The goal of e-health is to change individual and public attitudes to health and disease through the use of the Internet in public health education.

References
[1] Cresswell K M, Bates D W and Sheikh A 2017 Ten key considerations for the successful optimization of large-scale health information technology Journal of the American Medical Informatics Association 24(1) 182-187
[2] Girosi F, Meili R and Scoville R 2005 Extrapolating evidence of health information technology savings and costs Santa Monica, Calif.: RAND Corporation p 94
[3] Eskelinen A, Remes V and Helenius I 2006 Uncemented total hip arthroplasty for primary osteoarthritis in young patients: a mid- to long-term follow-up study from the Finnish Arthroplasty Register ActaOrthop 77 57-70
[4] Farmer F and Ayme S 2013 EURO-WABB: an EU rare diseases registry for Wolfram syndrome, Alstrom syndrome and Bardet-Biedle syndrome BMC Pediatrics 13 130-136
[5] Flanagan P T, Relyea-Chew A, Gross J A and Gunn M L 2012 Using the Internet for image transfer in a regional trauma network: effect on CT repeat rate, cost, and radiation exposure J Am Coll Radiol 9(9) 648-656
[6] Geerts W H, Bergqvist D and Pineo G F 2008 Prevention of venous thromboembolism: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition) II Chest. 33(6) 381-453
[7] Gold M and McLaughlin C 2016 Assessing HITECH Implementation and Lessons: 5 Years Late Milbank Q. 94(3) 654-687
[8] Heekin A M, Kontor J and Sax H C 2018 Choosing wisely clinical decision support adherence and associated inpatient outcomes Am J Manag Care. 24(8) 361-366
[9] Tokarev K E, Orlova Yu A, Rogachev A F, Rudenko AYu and Protsyuk M P Neural network application for predictive modeling IOP Conference Series: Materials Science and Engineering 905 012069
[10] Hooker J A, Lachiewicz P F and Kelley S S 1999 Efficacy of prophylaxis against thromboembolism with intermittent pneumatic compression after primary and revision total hip arthroplasty II J Bone Joint Surg Am. 81(5) 690-696
[11] Imhof H, Dirisamer A and Fischer H 2002 Change in process management by implementing RIS, PACS and flat-panel detectors Radiologie 42(5) 344-350
[12] Insall J N 1989 Rationale of the knee society cl
[13] Insall J N 1989 Rationale of the knee society cl
[14] Timoshenko M A, Rogachev A F, Medvedeva L N, Timoshenko M A and Tokarev K E 2019 Analysis and support of decision making with the use of latest information and communication technologies for development of social and economic area with regard to capabilities of different
categories of population  The Leading Practice of Decision Making in Modern Business Systems: Innovative Technologies and Perspectives of Optimization 9 87-98
[15] Kim J, Ohsfeldt R L and Gamm L D 2016 Hospital Characteristics are Associated With Readiness to Attain Stage 2 Meaningful Use of Electronic Health Records J Rural Health. p 18
[16] Kern L M, Edwards A and Kaushal R 2016 The Meaningful Use of Electronic Health Records and Health Care Utilization Am J Med Qual. 31(4) 301-307
[17] Kisekka V and Giboney J S 2018 The Effectiveness of Health Care Information Technologies: Evaluation of Trust, Security Beliefs, and Privacy as Determinants of Health Care Outcomes J Med Internet Res. 20(4) e107
[18] Rogachev A F, Medvedeva L N, Timoshenko M A, Tokarev K E and Shiro M S 2019 Using Computer Modeling During Evaluation of Socio-Labor Potential of the Region. Advances in Intelligent Systems and Computing 726 989-1004
[19] Knepper M M, Castillo E M, Chan T C and Guss D A 2018 The Effect of Access to Electronic Health Records on Throughput Efficiency and Imaging Utilization in the Emergency Department Health Serv Res. 2018 53(2) 787-802
[20] Rexhepi H 2015 Improving healthcare information systems - a key to evidence based medicine University of Skovde, Sweden. Dissertation Series 7 p 103
[21] Weber K L, Jevsevar D S and McGrory B J 2016 AAOS Clinical Practice Guideline: Surgical Management of Osteoarthritis of the Knee: Evidence-based Guideline J Am Acad Orthop Surg. 24(8) 94-96