THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE HEALTHCARE SYSTEM AND WAYS TO IMPROVE MANAGEMENT EFFICIENCY

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Abstract: This article examines pressing issues related to improving the efficiency of the healthcare system. The growing population, increasing prevalence of chronic diseases, and rising demand for medical services necessitate the use of faster and more effective ICT tools in healthcare. The study explores the automation of patient data storage in digital systems, the online management of medical services, and the opportunities provided by telemedicine.

Keywords: information and communication, automated system, electronic medical record, digital diagnostics, telemedicine, and remote services.

INTRODUCTION

The modern healthcare system requires ensuring human health, improving service quality, and using resources efficiently. In this process, the role of information and communication technologies (ICT) is steadily increasing. ICT enables healthcare institutions to manage data quickly and accurately, digitize medical services, and analyze information effectively. Improving the efficiency of the healthcare system is one of the most pressing issues today. The growing population, increasing prevalence of chronic diseases, and rising demand for medical services are putting significant pressure on the healthcare system. The use of ICT tools—such as automated patient data storage, online management of medical services, and telemedicine—plays a crucial role in addressing these challenges. The healthcare system today faces daily challenges that require active solutions. The process of digitizing medicine in Uzbekistan, which began decades ago and has now gained high momentum, is a logical response to external influencing factors. It can be said that the optimization of the industry and the process of qualitative transformation have rapidly developed, becoming one of the central priorities in recent years. The impact of the COVID-19 pandemic in recent years and the increasing demand for medical care have significantly accelerated the implementation of modern IT solutions in medical processes. The universal trend of digitalization, the widespread use of gadgets—including in healthcare—, the development and distribution of numerous online applications and services, telemedicine consultations, and artificial intelligence systems are all actively taking place before our eyes. The introduction of innovative technologies in medicine is leading to qualitative changes in the field, ultimately improving treatment processes, enhancing service quality for patients, and significantly influencing healthcare system management.

Medical digitalization involves the implementation and application of IT technologies and digital services across all aspects of the healthcare system, from overall system management to the

practical activities of local doctors. Digitalization encompasses qualitative transformations in medicine, optimizing and automating processes, and ensuring the efficient operation of all sectors in both public and private healthcare segments, thereby increasing overall system efficiency.

LITERATURE REVIEW AND METHODOLOGY

The development of artificial intelligence as a scientific discipline became possible only after the creation of computers, which occurred in the 1940s. At the same time, N. Wiener developed his fundamental works on cybernetics. In 1954, under the leadership of Professor A. A. Lyapunov, the seminar "Automata and Thinking" began its work at Moscow State University. Research conducted in the 1960s and 1970s led to the creation of the first expert system called DENDRAL. Although it was developed for use in organic chemistry, it later served as the foundation for the MYCIN system, one of the earliest and most important applications of artificial intelligence in medicine. The 1980s and 1990s witnessed the spread of microcomputers and the emergence of global networks. Scientists concluded that artificial intelligence systems should be developed for healthcare. Researchers emphasized that such programs should be designed to compensate for the lack of perfect information and be based on the experience of medical professionals. New approaches related to fuzzy set theory, Bayesian networks, and artificial neural networks were developed to reflect the growing need for intelligent computing systems in healthcare. Since 2002, technology has taken a significant leap forward, with both IT giants and entire nations joining programs to integrate artificial intelligence into medicine. Today, scientists hope that artificial intelligence will enable the achievement of precision medicine in the near future, where each patient will receive personalized treatment based on their unique genetic and other characteristics. The medical and technological advancements of the past half-century have made it possible to elevate healthcare to the next level.

Medical Data Management – The use of electronic medical records, digital diagnostics, and automated databases allows for efficient management of patient information.

Telemedicine and Remote Services – These technologies enable remote consultations, diagnostics, and treatment processes.

RESULTS

Improving Management in Medical Institutions. The implementation of planning, resource allocation, and monitoring systems based on ICT enhances management efficiency in healthcare institutions. In the modern world, information technology (IT) plays a crucial role in the development of all sectors, including healthcare. The interaction between specialists and technology is aimed at improving the efficiency of healthcare services, optimizing resources, and accelerating diagnostics. Through the digitalization of medicine, the following objectives are being achieved: Improving the quality of diagnostics and treatment. The computerization of medicine, along with the integration of artificial intelligence, helps doctors make more accurate diagnoses and develop personalized treatment plans based on big data analysis. Optimizing the operations of medical institutions. Automating routine tasks such as maintaining medical histories, prescribing medications, and monitoring treatments allows doctors to dedicate more time to direct patient care. Accelerating scientific research. IT facilitates the rapid collection and analysis of scientific data, speeding up the development of new drugs and therapeutic approaches. Increasing access to medical care. Telemedicine and mobile healthcare technologies enable the delivery of quality medical services even in remote and underprivileged areas.

Enhancing communication between patients and healthcare institutions. Electronic health systems and data-sharing platforms simplify the consultation process and improve interaction between doctors and patients. To substantiate these scientific and theoretical findings, a study was conducted among healthcare professionals. The survey questions were developed using the Google Docs electronic system, and respondents were provided with a link to submit their answers: https://docs.google.com/forms/d/1VVkIwG2kvkxaCCxNDTFCYXRKNbIC1qNfLLxlEP92UCU/edit survey link. The main goal was to assess the awareness of healthcare professionals regarding ICT

tools and the existing applications and systems available to them. As a result, the following findings were obtained:

Question	Answer 1	Answer 2	Answer 3	Answer 4
1.How many years of experience do you have in the healthcare system or how long have you been using it?	1-5 years= 34,4%	More than 11 years = 28.1%	Less than 1 year = 25%	6-10 years=grows in 12.5%
2. Which type of healthcare facility do you work at or use?	Public hospital = 59.4%	Polyclinic = 34.4%	Private clinics= 6,2%	QVP=0
3. To what extent do you think ICT (electronic medical records, telemedicine, artificial intelligence, etc.) has been implemented in the healthcare system?	Moderately = 53.1%	To a small extent = 34.4%	Insufficiently developed = 9.4%	Not implemented at all = 3.1%
4. How effective is the use of ICT in your healthcare facility?	Partially effective = 50%	Highly effective = 28.1%	Slightly effective = 18.8%	Not effective at all = 3.1%
5. Do you use the electronic medical records system?	Sometimes use= 43,8	Yes, I use it all the time = 28.1%	No use=18,8%	Our facility does not have such a system = 9.4%
6. How does ICT usage impact your professional activities?	Increases work efficiency = 81.3%	Complicates work processes = 9.4%	No impact = 9.4%	
7. Do you think electronic queue systems help improve the quality of medical services?	Yes very useful=62,5%	Partially useful=34,4	No benefit at all = 3.1%	I have not used this system = 0%
8. Do you find electronic prescriptions more convenient than traditional paper prescriptions?	Yes, much more convenient = 71.9%	Partial convenient=25%	No, paper prescriptions are better = 3.1%	
9. Do you think ICT helps reduce corruption in the healthcare system?	Yes, significantly reduces it = 68.8%	Partially impacts = 21.9%	No impact at all = 6.2%	On the contrary, it increases the problem = 3.1%

10. What do you think are the main challenges in implementing ICT in the healthcare system? (Multiple choices possible)	Poorly developed ICT infrastructure = 45%	Insufficient knowledge and experience of specialists = 28.6%	Cybersecurity issues = 15.3%	Financial constraints = 11.1%
11. Do you think electronic medical records are adequately protected?	Partially protected = 59.4%	Yes, a secure system exists = 31.3%	No, the data is at risk = 9.3%	
12. Do healthcare professionals need additional training and education on ICT?	Yes, very important = 71.9%	Partially important = 25%	No, there is no need = 3.1%	
13. Which ICT services do you consider most important for development? (Multiple choices possible)	Remote consultations = 44.2%	Electronic medical records = 22.1%	AI-based diagnostics = 18.4%	Mobile health applications = 15.3%
14. Do you think the government is making sufficient efforts to integrate ICT into the healthcare system?	Yes, sufficiently = 37.5%	Partially sufficient = 37.5%	No, not enough = 25%	
15. What suggestions do you have for improving ICT services in the healthcare system?	Ensure proper and timely material support	Pay close attention to the issue	Ensure specialists have adequate knowledge	Develop the most user-friendly applications possible

DISCUSSION

The presented results are recommended for use as a source by researchers as needed. As a result of this scientific study, several pressing issues have been analyzed, and possible solutions have been proposed:

1.Problem: Developing ICT infrastructure requires significant financial investment.

Solution: Promote public-private partnerships – engage IT companies and the private sector to implement innovative solutions.

2.Problem: Collaboration between the private sector and the government is insufficient.

Solution: Gradual modernization of ICT infrastructure – instead of digitizing all hospitals simultaneously, implement the process step by step, starting with key sectors.

3.Problem: The protection of electronic medical data is inadequate.

Solution: Strengthen encryption and data protection systems – use advanced technologies such as blockchain.

4.Problem: There is a shortage of cybersecurity specialists.

Solution: Improve cybersecurity knowledge among employees – organize specialized training for doctors and administrators.

5.Problem: The internet quality in some hospitals is poor.

Solution: Ensure high-speed internet access in all medical institutions – collaborate with mobile operators and internet providers.

6.Problem: There is no unified database between hospitals and polyclinics.

Solution: Create a national electronic healthcare system – establish a common database for all medical institutions. Implement electronic medical records – ensure each patient has a unique digital medical card.

CONCLUSION

The implementation of information and communication technologies (ICT) in the healthcare system enhances the quality of medical services, improves resource efficiency, and optimizes management processes. ICT increases the transparency of healthcare services and provides patients with convenient and fast medical assistance. Information technologies have taken medicine to a new level, as quick access to and exchange of medical data is crucial. Reducing the time needed to find solutions to medical issues is critical, as time is often a decisive factor in saving lives. Thanks to IT, medicine has begun to develop more actively, making not only patient record-keeping more efficient but also simplifying the process of providing first aid and emergency medical care.

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