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KEY ASPECTS OF HEALTH SYSTEM DIGITALIZATION

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Abstract. *According to the results of the study, it was determined that now, the healthcare systems of absolutely all countries of the world are under enormous pressure. Several reasons, which are to expand the number of services and improve the quality of medical care, facilitate this. Simultaneously, the scale and complexity of medical needs is growing due to the increase in the size and life expectancy of the population, the spread of epidemiological diseases and the growth of public expectations for more personalized and comfortable services. The gap between the supply and demand for health services is growing, and most countries are striving for a digital transformation of the system to close this gap. Modern digital technologies can integrate care, identify and reduce risks, predict and help manage population health needs and improve the quality of care.*

Keywords: *healthcare digitalization, modernization, Uzbekistan, health system.*

Relevance

Health systems in all countries of the world are currently facing global challenges, among which the COVID-19 pandemic has taken the first place, as well as inequalities in the availability of medicine, differences in the results of diagnosis and treatment, and an increasing demand for medical services from the elderly population.

The digital healthcare transformation is currently a global trend. The healthcare digitalization contributes to and complements the classical methods of public health work, which in turn improves the quality of medical care, prevention and rehabilitation of infectious and non-communicable diseases. The growth points of digital healthcare are emerging technological opportunities for remote provision of medical services (telemedicine), the use of mobile technologies (mobile-health), big data processing and artificial intelligence.

According to the Statista agency, the volume of the global digital health market (Digital Health) in 2019 amount to $ 106 billion, and by 2026 it is expected to grow to $ 639 billion [3].

The main advantages of healthcare digitalization [1]:

• Economic. By reducing the physical contact of patients with medical workers and technological modernization of the system of medical services.

• Social. The expansion of access to medical care.

• Professional. Improving quality by reducing medical errors, developing predictive and personalized medicine.

Taking into account the trends in the development and reform of the modern understanding of traditional medicine, scientists note the following aspects [2]:

• The trend is shifting towards prevention and individual and patient well-being. In this connection, medical services can be provided not only in medical institutions but also in any place where a person is located. Moreover, health is considered a broader concept, which also includes social, family, spiritual and economic well-being.

• Digital technologies enable patients and healthcare professionals to receive information to help make decisions about the prevention, diagnosis and treatment of diseases. Digital decision support platforms increase the efficiency and effectiveness of care and provide additional control over patient safety.

• Patient involvement in health and wellness decisions. Patient-centered or personalized healthcare as a response of the healthcare system to the trend of increasing a person's concern for their own and public health, is provided by the development of digital technologies that provide both free access to information about health and decision-making platforms and one's own health as a "second" opinion.

A study of the available literature showed that in countries with developed digital healthcare, the state plays a major role in ensuring the technological transformation [13]. Numerous countries are developing, implementing and improving legislation, infrastructure and public consent to transform healthcare systems towards their greater digitalization.

The aim of the study was to analyze the existing practices of digitalization of healthcare systems and develop recommendations for its effective implementation.

Materials and Methods

We studied publications, regulatory documents, strategic and conceptual reports on the implementation of digitalization in different countries of the world, particularly from medicine and healthcare in the referenced databases: Web of Science, Scopus, EBSCO Publishing and Springer Link. The requests contained the names of the topics being studied: the digitalization of the healthcare system, current trends in the development of healthcare, challenges and problems of digitalization of healthcare.

Results and Discussion

Thus, the United States, with its developed innovation and entrepreneurial ecosystem, relying on the development of a start-up culture, is dynamically transforming and developing digital healthcare. Australia has developed a National Digital Health Strategy and established a personal e-platform as the primary health digital resource for all citizens. The UK has established national structures to manage the transformation of the NHS towards digitalization. Turkey has also developed a single digital and mobile platform to interact with its citizens on all health issues. Ireland approved the e-Health strategy, the state structure "E-health of Ireland" was created in the country and the position of chief information officer in the structure of the health service was established [15].

Denmark is implementing one of the most ambitious digital health strategies in Europe, and the government is investing through the country's technology investment fund in building a platform called "World-Class Digital Service for accessing aggregated data about Danish citizens. Israel's help strengthen the country's position in the field of digital health through grants and investments, announcing grants and investments for the digitization of the personal health records of citizens [15]. Electronic medical records in Estonia are part of a unified medical exchange platform [6].

In connection with the digital transformation, many countries should change, develop and implement appropriate regulatory and technical standards for the functioning of digital health. Standardization is required in electronic databases such as facility registries, health care provider registries, health workforce registries, national insurance scheme registries, unique citizen

identification schemes, essential drug and product catalogs, priority disease coding registries and laboratory parameter values, terminologically lists, and device interoperability registries.

Portugal is an example of a national shift towards digital health. Currently, there are 60 systems of information and communication technologies of various levels of development operating in the country. The General Services Division of the Portuguese Ministry of Health develops and establishes uniform standards for integrating systems based on the implementation of the national electronic health record in the country [15]. The U.S. Centers for Medical Care and Services Medicare and Medicaid have approved a policy for providing patient-accessible information through open application programming interface (API) technology. In England, a set of technical standards for the interoperability of clinical information systems has been developed, according to which mobile applications being developed require regulatory approval from the relevant government agencies. France has introduced a reimbursement system for telemedicine providers, under which telemedicine consultations are reimbursed at the same rate as physical primary care.

Several countries are moving towards an open innovation platform or ecosystem of innovation around patient health data that allows service providers to develop and offer their digital projects.

For example, a partnership led by the Finnish state social insurance system has created a set of digital health services for the social and medical sector. These services, Kanta's national service, include personal electronic health records, prescription service, a pharmaceutical database, a patient data repository, and archives. The architecture of the system is open, which allows software vendors to develop their own interfaces for the content of the Kanta service [6, 15].

Some countries are developing open platforms, for example in Denmark the OpenTeleHealth telemedicine platform provides for developing new applications by the third-party vendors.

In the UK, NHS England has developed an open information system architecture (API) policy that defines the basic technical requirements for healthcare organizations when developing, upgrading, or purchasing information systems [10].

Israel is setting national regulations for digital health and information technology, maximizing the country's potential as a "start-up nation." Digital health is the engine of growth in Israel, supported by an innovative culture. The Israeli governance model ensures that the government works in partnership with academia, innovative companies, healthcare organizations, and industry to drive an evidence-based change [15].

However, there are numerous objective reasons why the digitalization of healthcare systems is still not fully implemented. For example, the digitalization of health care in Poland also encounters certain difficulties that determine the timing and priority of the implementation of the tasks set within the concept of digitalization [6]. It was assumed that the digitalization of healthcare in Poland, which covers electronic prescriptions, electronic referrals and the exchange of electronic medical records (EMR) on the P13 platform, will be fully completed and implemented from January 1, 2021. The success of this implementation is closely related to the level of digital skills of both healthcare providers and users of healthcare services. In their article, the authors point out the potential problems that may arise because of the digitalization of healthcare in social groups that are not adapted to ICT in their daily lives, especially in the case of older people.

Consider the example of Latvia, where from January 1, 2018, the use of the e-health system is mandatory, but the Digital Prescription (Electronic Prescription) project is still operating at full capacity. The experience of implementing and using digital medicine in Latvia shows that several problems faced by state institutions and local governments, medical institutions, medical personnel and patients. A systematic vision of the problems of introducing digital medicine requires at least considering and solving 7 relatively independent tasks: technical and technological, economic, legal, organizational, managerial, social, psychological and cultural. From the perspective of a systemic vision, the assessment of these aspects of the implementation of the e-Health program is presented through the wide use of data obtained from international organizations, Latvian state statistics, and scientific research, including those conducted by the authors. The main conclusion of the study is the need for the theory and practice of expanding access to healthcare based on digital medicine, considering a fuller variety of factors that stimulate and constrain this process and to attract specialists from the field of social sciences. The importance of this issue has increased significantly during the COVID-19 crisis. While there are no relevant statistics on the availability of medical services during a pandemic, individual assessments and recommendations from experts point to the need for an early and coordinated global promotion of e-Health. The example of Latvia demonstrates that there are significant barriers to e-Health. An accelerated decision-making process on this issue is not always associated with the country's economic resources. The authors' studies show the importance of solving institutional problems, ensuring better consideration of psychological, sociocultural and social factors [7].

Not all digital solutions have led to improved health outcomes and values. Most implementations are more cost-focused than patients use, more time in front of a display than patients, advanced technology solutions are spherical, and so on. The certain attention deserves a study by the author Moisil Ioana (2019) from Romania, based on a literature review (1992–2000; 2016–2019) and country reports on the introduction of digital technologies and strategies in healthcare. So, the author concludes that at the level of terminology, 3 terms describe the digital environment: digitization - ensuring the availability of information in digital format, digitization - the use of digital technologies in managing digital data and information, and digital transformation - the creation of new business models, integrate digital patient-centered data, processes and technologies. Digitization is presented in the submitted EHR data. The generally recognized benefits of EHR are the increase and evaluation of (financial) results, the identification of research facilitation, and the reduction of costs. Most authors consider the possibility of occurrence: high acquisition and maintenance costs, changes in workflow due to the new system, privacy and security issues (vulnerable to hacking), and alleged patient data due to system fear. Despite the use of advanced solutions in the field of artificial intelligence, robotic surgery, the computer context, augmented reality applications, widely recognized, assumed, must be considered due to subjective assumptions, predictions based on previous cases and various manifestations. Organizations must ensure the development of cultural changes associated with the digital world and prepare all participants - doctors, nurses, patients - for a new way of working and collaborating. This should be reflected also at the level of research on health information systems, which should be user-oriented and the use of data exchange between statistical IT systems. Strategic decisions must be made not only to transform the organizational culture but also to introduce dangerous technologies [12].

In a study conducted in Finland in 2017, heterogeneous types of data, such as personal data, big data, public data, statistical data, the third sector data, and social networks, collectively referred to as "rich data" are currently used in health policy development, and how data influence future decision-making. Carried out as a qualitative case study with municipal decision-makers in Finland, this study examines the use of data in the context of preventive mental health services and highlights mental health problems as a complex, systemic species with far-reaching long-term implications where the needs and demands for the right kinds of data go beyond the health domain. Providing rich data for policy decision-making is just one preliminary step towards data-driven policy making. Data analysis and visualization are essential elements to ensure that data are used by decision-makers to improve the health and well-being of society [5].

Several authors note the great impact of the COVID-19 pandemic on the processes of digitalization of healthcare systems. In their paper, the authors note that in the context of the COVID-19 pandemic, when health systems in general are under unprecedented pressure, and health services in particular, are experiencing increasingly significant changes in the way medical interventions are delivered. Their study consists of 3 chapters: the first chapter describes how health services are organized; the second chapter describes digital technologies in health and how they contribute to the digital transformation in health; the third chapter examines the impact of digital transformation on the management of health services. The authors conclude that the sustainability of health services will depend on how open their leadership will be to the integration of new technologies in the field of health [14].

Authors from Hungary believe that digitalization affects 90% of the healthcare sector. However, digital health is not only about technological transformation but also has significant cultural and social implications. This fundamentally changes the roles of doctors and patients, as well as their relationship. Moreover, since the second half of the 20th century, the growing number of chronic patients and the increase in life expectancy have presented new challenges for medical personnel. In their publication, they set out to explore the knowledge and attitudes of digital physicians towards digital health technologies and the transformation of the doctor-patient relationship. In this study, physicians interviewed argue that digital healthcare solutions can create a deeper doctor-patient relationship: knowledgeable patients are a huge help in collaboration, and technology is a major tool for creating a more engaged and responsible patient. Medical professionals in the future could rather take on the role of interpreter between technical data and the patient; as a guide in the digital health jungle. However, interviewed physicians also noted that the transition to digital technologies today is more beneficial for patients than for their doctors. The main conclusion of the study states that there is a dichotomy for doctors involved in digital technologies: they are enthusiastic about using digital opportunities, but they also experience difficulties associated with digital health [4].

On May 25, 2021, Uzbekistan adopted Presidential Decree No. PP-5124 "additional measures for the integrated development of the healthcare sector" where paragraph No. 5, section b) states that starting from June 1, 2021, in each family doctor's office, family polyclinic and multidisciplinary central polyclinics of districts (cities) one position is being introduced for an IT operator - a nurse working with an electronic healthcare system. Simultaneously, these positions are formed at the expense of staff units allocated in accordance with the President Decree of the Republic of Uzbekistan dated May 5, 2021 No. UP-6221 "On the consistent continuation of

reforms in the healthcare system and the creation of the necessary conditions to increase the potential of medical workers." [13].

Also, the Ministry of Health of the Republic of Uzbekistan has developed a strategy for the digitalization of healthcare until 2025 - E-Health-2025. The goal of the strategy is to create sufficient conditions for the use of all health services through the widespread introduction of modern information and communication technologies. First, it is necessary to strengthen the regulatory framework for the digital health system and its financing model. Also, an important condition is the advanced training of medical staff in the use of digital technologies, including nursing staff.

In this regard, it is necessary to strengthen the development and implementation of digital technologies in the healthcare of the Republic of Uzbekistan, where the role of paramedical staff will also be considered.

Digitalization is one of the top priorities on Uzbekistan's reform agenda. As part of the national strategy "Digital Uzbekistan-2030" digital technologies are being widely introduced in all sectors of the economy and spheres of public life. According to this document, approaches to improvement, including the healthcare sector of the republic, are changing. To date, Uzbekistan has adopted numerous legal documents regulating the development of digital healthcare.

The most comprehensive review and description of the expected reforms in the healthcare sector was presented in Presidential Decree No. UP-5590 dated December 7, 2018 "On comprehensive measures to radically improve the healthcare system of the Republic of Uzbekistan". It defines the main directions for further development of the health care system.

Also, the Decree of the President dated November 12, 2020 No. UP-6110 "On measures to introduce fundamentally new mechanisms in the activities of primary health care institutions and further increase the effectiveness of reforms in the healthcare system" establishes additional big goals for healthcare reform.

According to these documents, an integrated e-Health system will create the following new opportunities for the population:

1. Ability to obtain information about medical organizations and services;
2. Possibility of obtaining information about doctors, their qualifications, experience, appointment time;
3. Possibility of using electronic registration for outpatient services;
4. Ability to assess the quality of services provided;
5. Use of mobile applications in electronic public health services.

For medical organizations and health authorities, the following opportunities will be provided:

1. Transition of the institution to an innovative socially-oriented type of development;
2. Implementation of a healthcare standardization system;
3. Optimization of work processes by introducing an electronic medical record;
4. Accounting and monitoring of medical personnel, medicines, medical equipment, consumables;
5. Implementation and monitoring of financial transactions under the programs of state-guaranteed free medical care;
6. Maintenance of health statistics, accounting and reporting, as well as support for the system of national health accounts;

7. Data were exchanged between the health facilities and health authorities.

The documents determine that the use of information and communication technologies should become the main mechanism for monitoring the performance of medical institutions and the development of the sector as a whole.

Thus, general standardization is expected, the creation of the main elements of a compatible digital healthcare platform to perform the tasks of a "single electronic platform" for monitoring population health indicators, attaching patients to healthcare facilities, supporting an electronic medical record; the creation of an integrated e-health system that allows data exchange, provision of electronic services to patients by creating registers, reporting and monitoring components.

A significant role is played by the automation of the process of diagnosis and treatment, as well as the introduction of information and communication technologies, medical information systems, telemedicine, electronic medical records and electronic prescriptions in the field of healthcare institutions. So, the author Kodirova A. in her work (2017) reveals the existing achievements, projects and problems of e-health in Uzbekistan. Based on the results of the analysis, the author notes that in Uzbekistan, the healthcare system is actively implementing specialized medical information systems as part of various telemedicine projects. One of the most important areas is the improvement of the system of medical information in the field of reproductive health, women's health, as well as issues of protecting the health of children and adolescents. The main expected results of the introduction of e-health and the use of telemedicine technologies and systems that increase the efficiency of healthcare are strengthening the health of the population; reduction of morbidity, disability, mortality; increasing the availability and quality of medical care; strengthening primary health care. healthcare; creation of conditions for the provision of effective medical care at the prehospital stage; development of a preventive direction of health care; meeting the needs of the population in high-tech types of medical care [11].

Particular attention has been paid to digitalization issues by the government of the Republic of Uzbekistan, where all the necessary regulatory documents have been prepared, and work has been completed to create the necessary infrastructure for the effective implementation of digitalization in the healthcare system [8, 9]. Simultaneously, the existing problems and possible solutions for further reforming the healthcare system are analyzed, including through the effective use of modern innovative technologies [9].

Thus, thanks to the implementation of extensive state health programs in Uzbekistan, the health care system has been almost completely overhauled. The country has taken steps to create an Integrated National Health Information System. Additionally, the process of informatization still faces many difficulties and proceeds unevenly. The success of healthcare informatization in Uzbekistan at this stage depends on the solution of organizational and technical issues.

Conclusion

Health systems around the world are currently under unprecedented pressure. While the number of services is expanding and the quality of care is improving, the scope and complexity of medical needs are growing due to an increase in the size and life expectancy of the population, the spread of epidemiological diseases and rising public expectations for more personalized and comfortable services.

In 2020–2022, the COVID-19 pandemic significantly affected the social and economic situations of each country and contributed to the modernization of the traditional model of

healthcare delivery, which led to the accelerated implementation of digital solutions, especially in the field of telemedicine. These processes have also been actively developed in Uzbekistan.

Countries differ in their ability to provide services, the number of doctors, nurses and beds per capita, and the share of GDP spent on health care. The gap between the supply of resources and the demand for health care is growing, and most countries are striving for a digital transformation of the system to close this gap. Digital technologies can integrate care, identify and reduce risks, predict and help manage population health needs and improve data quality to deliver timely, effective and safe health care. Digital transformation is the management of change through technologies that help improve the efficiency and quality of service delivery.

The transformation of healthcare is a process that involves all industry participants: from the state, the population and the medical community to major manufacturers of medical technologies and developers of IT solutions.

The policy of digital transformation of healthcare requires not only the introduction of new technologies, but it should also include:
- Developed legal and regulatory ecosystem;
- Innovation ecosystem and digital competencies;
- Priority of public health and evidence-based medicine;
- Single national digital data management structure.

The experience of developed countries, indicating the feasibility and effectiveness of the implementation of national strategic and program documents on the digital transformation of healthcare systems, may be relevant for developing these documents in the Republic of Uzbekistan.

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