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Opportunities of Digital Technologies in The Healthcare System

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ABSTRACT: This article explores the necessity and possibilities of implementing digital technologies in information exchange processes within healthcare institutions. The development level of the healthcare system in the Republic of Uzbekistan from 2000 to 2022 is analyzed, emphasizing the importance of integrating information technologies in medical facilities to address various issues in this field. An algorithm for creating, structuring, collecting, processing, analyzing, and disseminating medical information in healthcare institutions is proposed based on literature data. Using this algorithm, an automation program for managing medical documents in healthcare institutions is suggested, opening up new possibilities.

KEYWORDS: Digital technologies, Digital healthcare, Medical institution, Information system, Digital medicine, Population demographic growth, Medical documentation, Number of physicians, Number of hospital beds, Information exchange, Automated system.

INTRODUCTION

In the context of global development of information processes worldwide, considering socio-economic relations, Uzbekistan faces the imperative of expanding the use of modern information technologies and communications in all sectors of the economy, society, and other fields. The integration of digital technologies into economic and socio-economic relations not only accelerates production, product delivery, and service provision but also enhances their quality, thereby reducing additional expenses.

Digital technologies play a key role in accelerating production processes, goods delivery, and service provision, contributing to the reduction of costs in these processes. The implementation of information technologies and the development of the digital economy are strategic goals of state policy aimed at ensuring comprehensive economic development in Uzbekistan and stimulating economic growth.

Within the framework of the adopted Development Strategy of the New Uzbekistan, comprehensive measures are being implemented to modernize the healthcare system, improve health preservation, and enhance the qualifications of medical personnel in 2022-2023. The implementation of a healthcare development strategy until 2026 is also planned, including the application of modern information technologies in the healthcare system to improve access to medical services and provide extensive opportunities for remote medical assistance.

MAIN SECTION

In 2023, the President of the Republic of Uzbekistan issued a decree titled "On Additional Measures for the Digitalization of the Healthcare System." According to this decree, the implementation of advanced digital technologies in the healthcare system is envisaged, including the establishment of a digital healthcare platform, the development of a comprehensive information database for medical institutions at all levels, and the implementation of the "Digital Healthcare Development" project aimed at strengthening and supporting the healthcare system.

The "Action Plan"for the implementation of this project has been approved, which entails the creation of a unified healthcare platform based on the international standard FHIR (Fast Healthcare Interoperability Resources). The plan also includes the integration of information systems within the healthcare system, the development of standards, classifiers, information directories, and nomenclature. Additionally, the creation and approval of software to support the core functions of the Medical Information System have been outlined in the plan.

In the adopted legal and regulatory documents and the specified objectives, primary attention is given to expanding the use of digital technologies in healthcare, improving the quality of provided medical services, and extending the possibilities for delivering healthcare to the population. It is important to note that conducting scientific research in the field of utilizing digital technologies in healthcare is planned to achieve our goals in gathering statistical information before the commencement of the studies.

Opportunities of Digital Technologies in The Healthcare System

In recent years, there has been a persistent global development in the digital medicine market. According to research by Global Market Insights, a steady growth of the global digital medicine market to $116 billion is expected by 2024. The key directions of digital healthcare development include cloud medical technologies, systems for analyzing large volumes of information for data reprocessing, remote disease monitoring, digital diagnostics for remote health status determination, and the creation and modernization of digital clinics.

Recent global analytical studies presented by the Organization for Economic Cooperation and Development (OECD) indicate a progressive growth in healthcare expenditures by 2030 among member countries. According to the research, an increase in healthcare expenditures by 15-20% is expected in OECD countries compared to 2015. In 2015, the share of healthcare expenditures as a percentage of the total gross domestic product (GDP) in OECD member countries was 8.8%, 9.8% in the United Kingdom, 16.8% in the United States, while in the Russian Federation, healthcare expenditures accounted for only 3.5% of the GDP.

According to our analyses, healthcare expenditures in Uzbekistan at the end of 2021-2022 constitute approximately 2.7% of the GDP. Despite deliberate efforts in recent years to increase healthcare expenditures, these figures remain significantly below the average level among OECD member countries.

To more clearly define the dynamics of changes in the healthcare system in Uzbekistan from 2000 to 2022, let's analyze key indicators. We will also focus on changes in the structure of healthcare expenditures and their correlation with population health. It is important to emphasize that a crucial indicator of healthcare quality in the country is the number of inpatient medical institutions providing care to the sick, which has decreased from 138.6 thousand to 117.5 thousand (a reduction of 15-20%) since 2000. However, the number of hospital beds per 10 thousand population has decreased from 55.9 to 45.2 (an 80.9% reduction). Nevertheless, the growth in the population was not accompanied by a similarly sharp decrease in these indicators or the number of hospitalized patients in inpatient medical institutions annually (Figure 1).

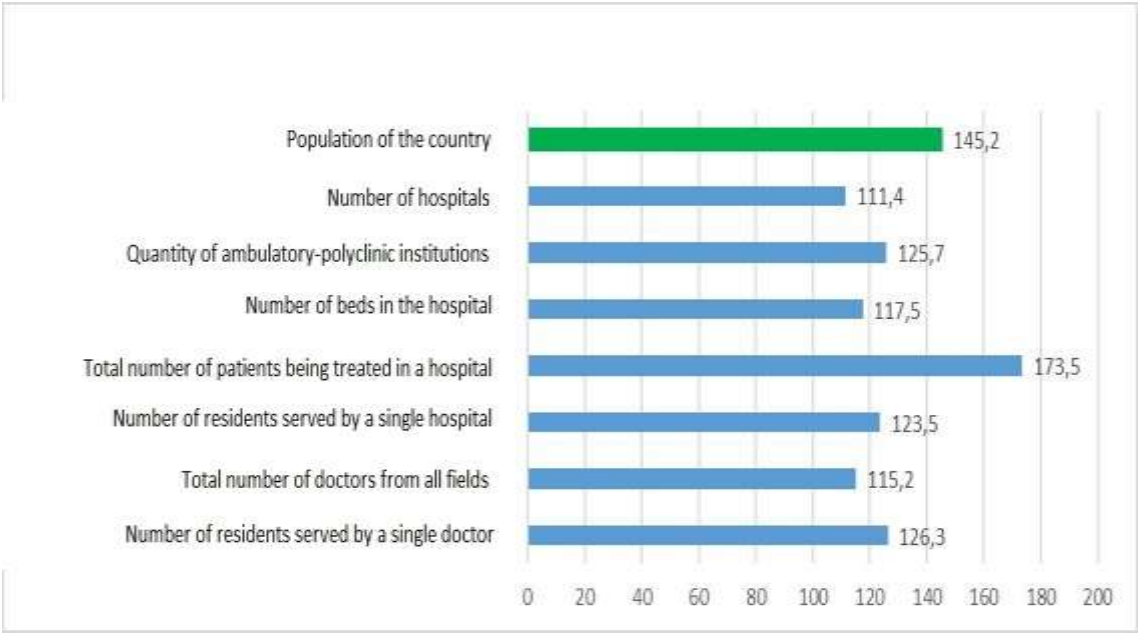

Figure 1. Indicators of the growth of key parameters in the healthcare sector in 2022 compared to 2000.

During the analysis of demographic trends, criteria have become apparent for evaluating the provision of medical services to the population. According to the provided data, there has been a change in the number of hospitals that people directly visit. In 2000, there were 179 hospitals where people sought direct care, and by 2022, this number had decreased to 42 hospitals, which is 123.5% below the anticipated figure and corresponds to 221 patients. This indicator is noticeably lower than the population dynamics in the country.

Another important indicator used to assess the provision of medical services to the population is the number of qualified doctors contributing to healthcare. According to the provided data, in 2000, the country's healthcare system employed 81.5 thousand qualified doctors, and by 2022, this figure had increased to 93.9 thousand (a growth of 15.2%).

This indicator also reflects the increase in the number of qualified doctors in the country's healthcare system from year to year, which may be associated with the growing professional pressure on doctors. In 2000, on average, there were 304 people per qualified doctor, and by 2022, this figure had increased by 126.3% to 384 people.

These changes can also be explained by variations in the professional pressure on the medical workforce from year to year.

Figure 2, presented below, illustrates a comparison of key healthcare indicators for the years 2000 and 2022 in the context of population demographic dynamics.

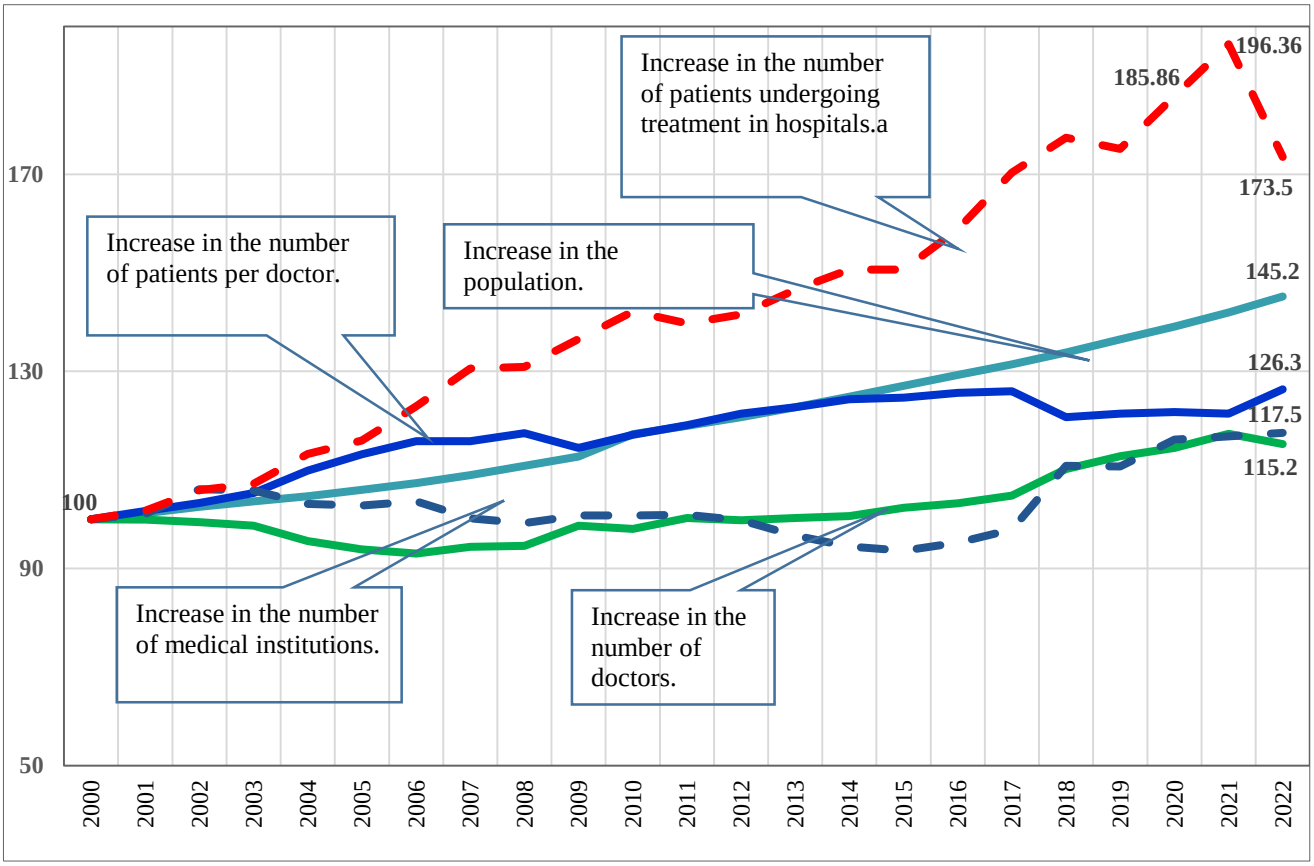

Figure 2. Dynamics of key demographic and healthcare indicators for the population from 2000 to 2022.

Interestingly, demographic indicators of population growth have increased by 145.2 percent since 2000, while the number of patients treated in hospitals has increased by 173.4 percent. It is important to note that in 2020-2021, due to the global COVID-19 pandemic, these indicators experienced a sharp rise. Attention should also be drawn to other key metrics such as the number of hospital beds, the population seeking medical care, and the number of healthcare workers operating within the healthcare system over the past few years. The dynamics of these indicators highlight a noticeable population increase in the country. Modern healthcare organizations possess extensive databases that are collected and processed. These data are extremely valuable for doctors, managers, and leaders as they can be utilized in various areas related to the quality of healthcare and the development of each region, as well as the overall well-being of the population. International experience shows that information technologies play a crucial role in healthcare, yet each country has its own path in developing these technologies.

Currently, there is a low level of digital technology implementation in the information exchange processes within the medical institutions of our country. Electronic cards, reports, procedural documents, patient records, medications, and other documents are actively being implemented in most healthcare facilities. This impacts the efficiency of healthcare institutions and the quality of medical services provided.

Within our healthcare system, various types of medical institutions operate, including hospitals, clinics, healthcare and prevention facilities, along with corresponding laboratories providing information about medical activities in various forms and across more than **four hundred** scheduled medical documents. In this context, a sequential algorithm has been developed for the creation, structuring, collection, reprocessing, analysis, and dissemination of medical information in medical billing documents. This algorithm has been adopted based on the results of theoretical research conducted in healthcare institutions. The aim of the proposed approach is to enhance the efficiency of information flow in the healthcare system using digital technologies and establish an automated system for managing medical documents in healthcare institutions operating within the healthcare system.

With the aim of integrating digital technologies into the information collection processes in medical institutions, a software product has been created to automate the processing of medical documents based on the algorithmic models presented earlier. This software product, designed for use in electronic medical document accounting systems, has been officially approved and registered under the number DGU 09185 by the Intellectual Property Office at the Ministry of Justice of the Republic of Uzbekistan.

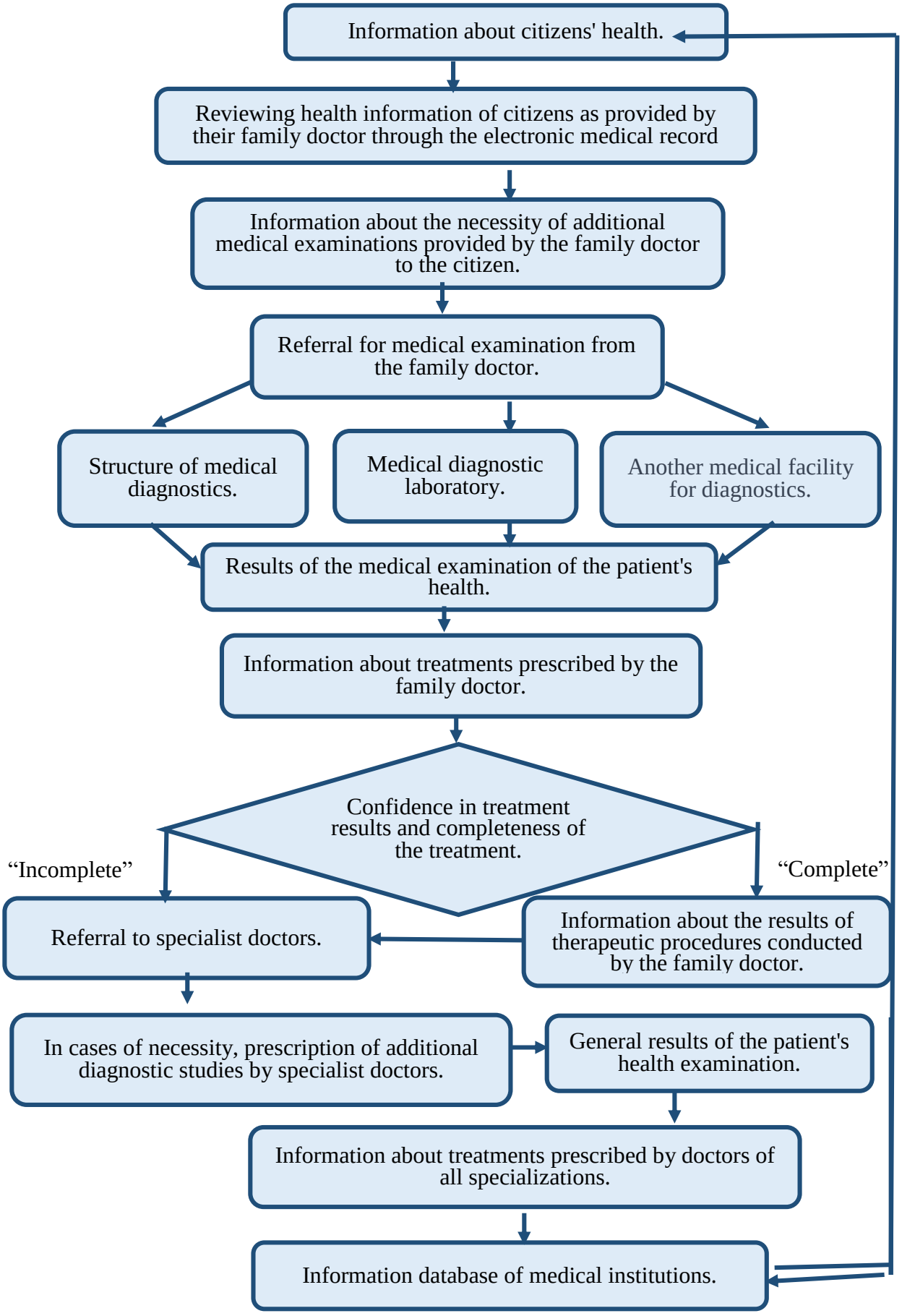

Figure-3. Algorithm of information flow in the management of medical reporting documents.

CONCLUSION AND RECOMMENDATIONS

The software for automating the management of medical documents based on digital technologies, proposed and developed in medical institutions during scientific research, provides the following capabilities:

Providing consultations to patients, establishing diagnoses, and creating electronic records of diagnostic and treatment results in medical institutions;

Studying the dynamics of diseases throughout a patient's life, promptly analyzing their therapeutic progress;

Gathering information about the body's immunity levels regarding specific illnesses and the impact of various factors (allergens and others) on it;

Receiving patients, conducting diagnostics, expediting treatment plan determination by medical personnel, and creating opportunities for financial gains from utilizing the results.

Increasing the number of treated patients in medical institutions by expanding the range of medical services provided by state healthcare facilities;

The necessity for expanding the electronic database of long-term (non-expired) diagnostic procedure results to facilitate the potential increase in financial resources for patients through identifying the need for additional diagnostic procedures;

The opportunity to disseminate information about prescribed diagnostic procedures, treatment methods, and targeted payment amounts through mobile applications in real-time;

Quick access to information about diseases identified during a patient's life, treatment methods, and achieved results;

When necessary, providing employers and healthcare organizations with rapid information about the health status of employees facing specific illnesses;

Rapid and accurate information retrieval about contagious diseases in patients from social organizations and insurance companies, among others.

The scientific studies conducted in the course of the development of medical institutions indicate that the implementation of digital technologies in the processes of creation, systematization, collection, processing, analysis, and dissemination of medical information in healthcare institutions contributes to the automation of accounting documents in medical facilities before the introduction of software for automating the medical accounting system.

Purchasing and installing technical equipment capable of interacting with the software of the automated system in medical institutions;

Enhancing skills in working with the software of the information system implemented in medical institutions among healthcare professionals and middle medical staff;

Ensuring the confidential storage of information about patients' health conditions or their illnesses;

Providing continuous technical support and maintenance for technical means and equipment in medical institutions, as well as ensuring their proper operation by other individuals.

It should be noted that the implementation of digital information technologies in the field of electronic healthcare contributes to the increased efficiency and resilience of medical institutions in serving the population and other healthcare entities, facilitating the optimization of time and financial resources. Additionally, the electronic healthcare system provides the opportunity to obtain information about healthcare institutions and the list of medical services offered to the population, streamlining diagnostic processes and digitally registering results. This ensures access to financial, temporal, and other resources.

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