Development of electronic healthcare in Kazakhstan as a factor of improving the quality of medical services

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The relevance of the article is determined by the priority of the task of improving the quality and availability of medical care to the population, improving medical education and the health care management system, in the context of the systemic implementation of e-health technologies. According to WHO terminology, e-health involves the use of information and communication technologies not only in the health care system, but also covers public health, health management, financial and economic, educational and scientific aspects related to this area.

The article deals with the development of digital health care in Kazakhstan, the pace of development of which allows us to predict with confidence the intensive development of smart medicine in the future. The main stages of digitalization of health care were considered, while the main trends that characterize the features and problems of its development at the present stage were highlighted. It is expected that the introduction of information communication technologies into the health care system will allow a new level of quality of medical care provided to the population. The introduction of e-health technologies will allow remote monitoring of the population, increase patient awareness, improve access to health care, especially in remote areas.

Keywords: healthcare; information technologies; medical information technologies; digitalization of healthcare; e-health.

Introduction

The integration of the Kazakh economy into the world economy, the scope and nature of the activity of the system of social institutions, including the health care system, requires a new approach to organizing management. Its practical implementation, as well as new institutional conditions for the functioning of the health care system, require the development of a health care system based on the development of new ideas, legal norms, regulatory procedures and mechanisms implementing them, and in general, qualitative systemic changes in the Kazakhstan health sector.

Today, the development of e-health is one of the main priorities of the Republic of Kazakhstan from the point of view of sustainable and stable growth of the population's well-being, which should become a single, developed, socially oriented system designed to ensure accessibility, timeliness, quality and continuity of medical care.

Goals of Article

Goals of article is to consider the main aspects of digitalization of the healthcare sector in Kazakhstan and the prospects for its development.

Methods

In the course of writing the article and substantiating its main provisions, general scientific methods of cognition were used, including methods of ascent from the abstract to the concrete, analysis and synthesis, as well as methods of the system and integrated approaches, structural, factorial, analyzes.
Findings and Discussion of the Study

In the modern period, the economic development of the Republic of Kazakhstan is characterized by a social orientation. In a socially-oriented economy, the healthcare sector is one of the priorities of our state.

For the healthcare system of Kazakhstan, the most urgent problems now are to increase the effectiveness of the quality of medical services provided. Therefore, the budget policy in the area of health financing includes the provision of affordable and high-quality medical care to the entire population.

The Constitution of the Republic of Kazakhstan defines: «Citizens of the Republic of Kazakhstan have the right to health protection, the right to receive free of charge a guaranteed amount of medical care, established by law. Obtaining paid medical care in public and private medical institutions, as well as from individuals engaged in private medical practice, is carried out on the grounds and in the manner prescribed by law» (Constitution ..., 1995).

The reforms currently implemented in the healthcare system are aimed at preserving and strengthening the health of the population, forming and effective functioning of the system of providing affordable and high-quality medical services, as well as developing and introducing new schemes for organizing medical care and managing healthcare based on further sustainable development of the industry.

Today, digitalization of healthcare is considered to be one of the necessary conditions for the development of not only healthcare as the most important social sector, but also a major factor in the country's economic development. This is largely due to the fact that digital technologies in healthcare can help solve the main blocks of problems: accessibility and quality of medical care, as well as issues of disease prevention. The use of information technologies in the field of healthcare has a significant positive effect on a number of indicators, such as the efficiency of medical personnel, the quality of diagnostics and treatment in general, standardization of medical services, effectiveness of management decisions, availability of medical care. In general, the digitalization of healthcare can reduce the number of medical errors, improve the quality and speed of service, as well as the quality of management decision-making.

In Kazakhstan, digitalization in healthcare was implemented as a separate initiative on the project «Modernization of the healthcare system» within the framework of the President's Address «The Third Modernization of Kazakhstan: Global Competitiveness», one of the priorities.

The process of digitization of the healthcare system was launched in Kazakhstan since December 2017, while its full synchronization with the State Program «Digital Kazakhstan» was ensured.

The development of digital medicine in Kazakhstan was facilitated by a number of prerequisites:

Since the 1990s, the Ministry of Health of the Republic of Kazakhstan has ensured the development and implementation of a number of information systems aimed at accumulating statistical and analytical health information. These software systems provided data collection in accordance with the approved accounting and reporting documentation and continue to be used in several regions of the Republic of Kazakhstan. The implementation of these information systems assumed as direct beneficiaries of health managers at all levels, since their main goal was to collect statistical, analytical and financial information at the local level and present them at the regional and national levels. At the same time, medical workers and the population were indirect beneficiaries, since the effect of the implementation of these information systems was mainly reflected at the national level in the form of more efficient and informed political and management decisions.

In 2004, the National Telemedicine Network was established in Kazakhstan. By the end of 2016, she joined 204 health facilities, with her help staff of medical organizations at the district level (144 district and city hospitals) can get advice from colleagues from regional and republican hospitals and centers. In 2016, 28060 telemedicine consultations were conducted, consultations on cardiology were most in demand - 4,674 sessions, pulmonology - 3,666 sessions, neurology - 2,720 sessions. Over the period from 2004 to 2016, patients of medical organizations received more than 133 thousand telemedicine consultations.

For ten years, from 2005 to 2015, the budget project "Creating a unified health information system" was implemented in the country, within which six components were developed:

- Medical Statistical System;
- quality management system for medical services;
- drug supply management system;
- Resource Management Systems;
- the monitoring system of the sanitary-epidemiological situation;
- financial management system.

So, for example, the Information System «Medical Support» is intended for recording and providing outpatients with free medicines within the GARMP, forming common approaches to the discharge process and providing prescriptions.
The listed components of the unified health information system are fully implemented in three regions of Kazakhstan: Astana, Karaganda, and Akmola regions. Component SUMSU works throughout the country.

However, it should be noted that these components were developed on the «fat client» architecture, which made it difficult to implement, requiring significant investments in server equipment and the involvement of a large number of specialists for support. Since 2010, work has begun on translating the components of the unified health information system to a web application architecture («thin client»).

Simultaneously with the purpose of information support of the Unified National Health System, work began on the development of additional web applications, such as the Electronic Register of Inpatients, the Register of Attached Populations and others. It should be noted that the Register of the Attached Population, intended to form a single database of the total attached population, is one of the key portals of the Ministry. This portal provides organizations providing primary health care with up-to-date information about the assigned population through integration with the HBD «Physical Persons».

Support for the development and dissemination of information systems of the Ministry of Health of the Republic of Kazakhstan is also carried out within the framework of the World Bank and Government of the Republic of Kazakhstan project “Technology transfer and institutional reform in the health sector of the Republic of Kazakhstan”. From the funds of the WB project, the UHMIS IT infrastructure of Akmola and Karaganda regions was equipped, as well as the equipping of the city of Astana. As part of the WB project, the Center for Informatization of Health was created, which is one of the main implementers of the e-health program.

From 2010 to 2013, the following web-based information systems (web applications) were developed, implemented and operate throughout the Republic of Kazakhstan as part of the implementation of the tasks of the Unified National Health System:

1. Bureau of hospitalization;
2. Register of attached population;
3. Electronic Register of Inpatients;
4. Electronic register of cancer patients;
5. Electronic register of dispensary patients;
6. Drug Supply Information System;
7. Stimulating component of the per capita ratio.

In 2013, as part of a World Bank project, the Swiss Tropical and Public Health Institute conducted an assessment of information systems of the Ministry of Health of the Republic of Kazakhstan. As a result, the Development Concept of e-health of the Republic of Kazakhstan for 2013-2020 was developed, which was approved in order to modernize the existing model, to reorient it to the needs of the patient, improving the quality and availability of medical care.

According to this Concept, by 2020, the implementation of e-health in the Republic of Kazakhstan should provide the ability to automatically obtain timely, relevant, reliable, and sufficient information that provides a safe, fair, high-quality and sustainable health care system, focused on the needs of the patient. At the same time, a key element of e-health will be an electronic health passport that provides a logical structure for storing and exchanging key data on human health and is a tool for implementing the objectives of the health system aimed at improving the availability and quality of medical services, as well as improving management at all levels. Based on the information of the electronic health passport, a personal account of the patient is formed, which patients themselves will have access through the mobile applications DamuMed, InfoMed KZ.

This is a fast, convenient and already familiar way to many: make an appointment with a doctor at the clinic at the place of attachment or call a doctor at home, view the data of your electronic health passport, make your measurements if you are in the dispensary account, in addition, through the mobile application the patient can familiarize himself with the work schedule of doctors, determine the site of attachment by place of residence, there is also a button to call the doctor’s house, the «SOS» button for patients who are on "D" account, or are pregnant, and parents children.

An important step in the development of digitalization of healthcare has been the introduction of medical information systems in healthcare organizations designed to collect statistical information and provide funding for the healthcare industry. This form of organization of medical processes enables medical personnel, with the necessary technical support, to use a set of tools to collect, process, analyze, store and output medical information that relates to health and its condition for a particular person.

At present, there are 22 information systems operating online throughout the country that automate and increase the efficiency of the internal business processes of medical organizations, from appointment to dispensing of medicines.

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Today, 14 TB of data have already been accumulated in the information systems of the Ministry of Health of the Republic of Kazakhstan, which is comparable to 5.8 billion text pages. This is a significant amount of data that needs to be processed using big data technology and artificial intelligence, allowing for in-depth analysis of the problems and needs of the health system, monitoring of public health issues.

Today, the share of implementation of medical information systems in health care organizations in the country as a whole is 75.5%.

The introduction of the MIS allows for the transition to paperless maintenance of medical data and medical documents by generating «live data».

Since January 2018, the introduction of paperless medical records has begun in three areas - Akmola, Kostanay, West Kazakhstan. Currently, within the framework of this project, a phased rejection of paper forms in all regions of the republic is being carried out.

However, it should be noted that these information systems were not combined due to a number of objective and subjective reasons, including the independent choice of medical information systems (MIS) by health organizations or local executive bodies.

In addition, the equipment of medical organizations with computer equipment currently does not allow for the implementation of medical information systems across the
country. In most regions, with the exception of Astana, Akmola and Karaganda regions, the workplaces of medical personnel are not equipped with personal computers, there is no structured cable system and server equipment.

The equipment of doctors and nurses with computer equipment today is 82.7% in accordance with the data in Table 1.

Table 1 – Equipment by computer equipment of medical institutions of RK in a section of regions

<table>
<thead>
<tr>
<th>Region</th>
<th>The number of workplaces with the shift</th>
<th>The number of workplaces provided by computers</th>
<th>Equipment percentage, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akmola region</td>
<td>6053</td>
<td>4330</td>
<td>71.5</td>
</tr>
<tr>
<td>Atyrau region</td>
<td>8004</td>
<td>7222</td>
<td>90.2</td>
</tr>
<tr>
<td>East Kazakhstan region</td>
<td>3825</td>
<td>3239</td>
<td>84.7</td>
</tr>
<tr>
<td>East Kazakhstan region</td>
<td>8671</td>
<td>4998</td>
<td>57.6</td>
</tr>
<tr>
<td>Jambyl Region</td>
<td>4962</td>
<td>3762</td>
<td>75.8</td>
</tr>
<tr>
<td>Kostanay region</td>
<td>4404</td>
<td>4404</td>
<td>100.0</td>
</tr>
<tr>
<td>Karaganda region</td>
<td>7785</td>
<td>7785</td>
<td>100.0</td>
</tr>
<tr>
<td>Kostanay region</td>
<td>5260</td>
<td>4734</td>
<td>90.0</td>
</tr>
<tr>
<td>Kostanay region</td>
<td>5657</td>
<td>4476</td>
<td>79.1</td>
</tr>
<tr>
<td>Mangistau region</td>
<td>2984</td>
<td>2547</td>
<td>85.1</td>
</tr>
<tr>
<td>Pavlodar region</td>
<td>4732</td>
<td>4178</td>
<td>88.3</td>
</tr>
<tr>
<td>North-Kazakhstan region</td>
<td>4071</td>
<td>3259</td>
<td>80.1</td>
</tr>
<tr>
<td>South Kazakhstan region</td>
<td>12510</td>
<td>8839</td>
<td>70.7</td>
</tr>
<tr>
<td>Astana city</td>
<td>6940</td>
<td>5019</td>
<td>72.3</td>
</tr>
<tr>
<td>Almaty city</td>
<td>7945</td>
<td>7913</td>
<td>99.7</td>
</tr>
<tr>
<td>RK total</td>
<td>96843</td>
<td>79456</td>
<td>82.0</td>
</tr>
</tbody>
</table>

55.7% of healthcare organizations today have access to the Internet. In general, for the successful implementation of an e-health passport, it is necessary that each medical organization provide patient data.

To this end, it is necessary to complete 100% coverage with medical information systems, to ensure that medical institutions are fully equipped with necessary computer equipment and Internet access.

Conclusion

In general, summarizing the above, we can conclude that the pace of development of digitalization of health care makes it possible to predict with confidence the intensive development of smart medicine in the future. However, today there are a number of problematic aspects, in addition to the above problems with the provision of computer equipment and Internet access, which can slow down these processes. Among them are the following.

1. Problems in ensuring the information security of medical information systems. According to the government decree, for the industrial operation of medical information systems it is necessary for information system developers to have a certificate for information security. This procedure is expensive for both medical institutions and developers of these systems, while obtaining a certificate is a long process. And as a result, information security is not the responsibility of the developers themselves, the heads of health care institutions, or the operators who contribute information to information systems.

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