

## Development of Telemedicine in Kazakhstan

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### Abstract

**Aim and Objective:** Show the result of the introduction of telemedicine in the Republic of Kazakhstan.

**Materials and Methods:** We show the statistical data on the introduction of telemedicine in the Republican Medical Centers, the good development of the national telemedicine network in Kazakhstan.

**Keywords:** Health Care System; National Telemedicine Network; Remote Medical Services

### Introduction

The introduction of digital tools at the level of the healthcare system has a positive effect, which increases the availability, efficiency and quality of medical care. On October 12, 2021, the Decree of the Government of the Republic of Kazakhstan approved the national project "Quality and affordable healthcare for every citizen "Healthy Nation", the main goal of which is to increase life expectancy. The national project consists of the following areas:

- Increasing the availability and quality of medical care;
- Formation of a modern system of epidemiological forecasting and response;
- Development of the domestic pharmaceutical industry;
- Increase in the proportion of the population leading a healthy lifestyle and the development of mass sports.

For each direction of the national project, tasks, indicators of results and implementation activities are indicated. The improvement in the health indicators of the population of our country is also reflected in international rankings. At the end of 2021, there is an improvement in the position of the Republic of Kazakhstan in the ranking of the Sustainable Development Goals by the United Nations. Among 193 countries in 2020, Kazakhstan ranked 65<sup>th</sup>, and at the beginning of 2022, the United Nations improved the rating of our state by 6 positions to 59<sup>th</sup> place [1].

Within the framework of the implementation of the Pre-election platform of the President of the Republic of Kazakhstan "Fair Kazakhstan - for everyone and for everyone. Now and Forever" - expanding access to medical services at the location through telemedicine, ensur-

ing full access for every citizen to information about his health, including access to prescriptions for medicines in his personal account on the e-Government portal and the eGov mobile application through digital technologies. The introduction of digital technologies requires the digital transformation of business processes in companies. Digital information is taken from people and used for their own good [2]. Digital health plays a key role in achieving universal health coverage by providing rational and efficient models for delivering quality care that is equally accessible to everyone. At the same time, for the introduction of digital health, it is necessary to ensure a direct link between investments in its development and the solution of public health problems [1].

In 2004, a national telemedicine network was created in Kazakhstan, which is gradually building a platform for the provision of medical services that meets all international standards. The National Telemedicine Network of the Republic of Kazakhstan is a network of stationary and mobile telemedicine centers of healthcare organizations that are under the authority of an authorized body, united by a secure telecommunications infrastructure and equipped with hardware and software systems. The national telemedicine network is a key component of the national approach to strengthening the system of providing specialized medical care to the population of rural areas (telemedicine consultations), and also made it possible to overcome geographical problems and a shortage of medical personnel.

In their works, researchers have repeatedly proved that telemedicine is an alternative to consulting a doctor in areas where there is a shortage of highly specialized specialists [3,4].

The Republican Center for e-Health of the Ministry of Health of the Republic of Kazakhstan deals with the digitalization of healthcare:

- Health information systems;
- Telemedicine;
- Mobile healthcare (mHealth, mobile health).

The Ministry of Health of the Republic of Kazakhstan has expanded the potential of digital healthcare and continues to introduce innovative medical services: applications for mobile devices for the prevention and treatment of diseases. Requirements for electronic information resources for remote medical services have been developed.

Remote medical services are provided:

- 1) In an emergency form - in case of sudden acute diseases, and conditions, exacerbation of chronic diseases that do not pose a clear threat to the patient's life;
- 2) In a planned form - in case of diseases and conditions that are not accompanied by a threat to the life of the patient, the delay in the provision of which for a certain time will not entail a deterioration in the patient's condition, as well as when carrying out preventive measures [5].

The national telemedicine network is gradually expanding through the development of communication infrastructure, and already includes 209 medical organizations (district, regional and national levels). Together with the Republican Air Ambulance Center, transport medical assistance, disaster relief initiatives and a network of mobile pharmacies, the telemedicine network provides rural citizens with full access to medical care.

Telemedicine technologies are being actively introduced in Kazakhstan. With the advent of telemedicine, residents of rural areas began to receive the necessary specialized medical care from general practitioners and specialists with a narrow focus. For the period 2006 - 2008 a total of 7773 telemedicine consultations were held. Telemedicine consultations were held in 44 districts. Basically, telemedicine consultations are held between district and regional telemedicine centers. Every year, the number of telemedicine consultations more than doubles. Thus, in 2006, the total number of telemedicine consultations conducted was 1122, in 2007 - 2013, in 2008 - 4638. The most

frequent consultations were on cardiology - 27.2%, therapy - 17.9%, neurology - 12.1%, pediatrics - 9.6%, surgery - 6.9%, ENT pathology - 3.5%, in other specialties from 0.2 to 2.2%. Telemedicine consultations on the interpretation of the results of clinical and instrumental examinations were most often carried out according to electrocardiography - 38.6%, X-ray studies - 30.7%, laboratory studies - 16.7%, ultrasound studies - 2.8% [6].

Measures have been taken to update the regulatory legal acts in the field of healthcare in order to create legal conditions for the digitalization of the industry. The Ministry of Health of the Republic of Kazakhstan approved the Rules for the collection, processing, storage, protection and provision of personal medical data by subjects of digital healthcare: informed consent is a procedure for a written voluntary confirmation by a person of his consent to receive medical care and (or) participate in a specific study after receiving information about all aspects of medical care and (or) research that are significant for his decision. Informed written consent is drawn up in the form approved by the authorized body [7].

The year 2020 has become decisive for the development of telemedicine. The COVID-19 pandemic has made its own adjustments to medicine: the number of infected people has grown exponentially - medical workers simply had to respond as clearly and quickly as possible. The COVID-19 pandemic has forced us to look at telemedicine from a new angle and greatly accelerate its implementation around the world. In the context of the COVID-19 pandemic, there has been a significant increase in the importance of telemedicine services. The health care system of Kazakhstan has withstood a colossal burden due to the high growth of cases of coronavirus infection. During the pandemic, telemedicine has become an effective solution for providing the population with medical services. Many telemedicine consultations were held in various parts of the country.

In 2021, 1915 remote medical services were performed with the involvement of specialized specialists [8]. Treatment of patients using telecommunications did not become a matter of convenience during the pandemic period, it is a necessary measure related to ensuring the safety of life and health of the population. The COVID-19 pandemic was the starting point for the development of a new stage of telemedicine technologies around the world and made it possible to learn lessons for the future for the world community [9]. Many people have begun to realize the importance and prospects of telemedicine only now.

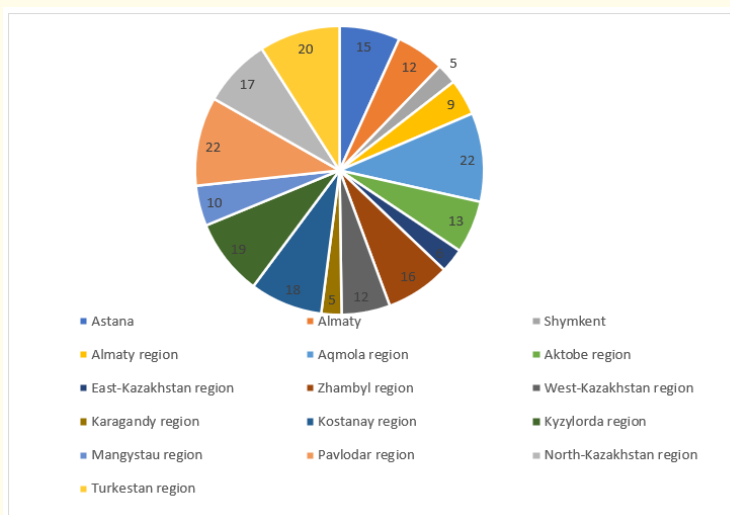


Diagram 1: List of NTMS objects for 2022.

For 12 months of 2016, leading specialists from 15 regional hospitals, the regional children's hospital in Shymkent and 14 republican clinics conducted 28,060 telemedicine and video consultations, of which 26,252 were conducted by regional hospitals, 1,808 by republican clinics. At the same time, 7477 radiographs, 4698 electrocardiograms and 1563 ultrasound examinations were deciphered. The most frequent teleconsultations were held in the following specialties: cardiology (16.7% of the total number of consultations), pulmonology (13%) and neurology (9.7%). Most often, telemedicine is used in Karaganda, South Kazakhstan and Akmola regions. Of the republican clinics, teleconsultations are most often carried out: the Research Institute of Cardiology and Internal Medicine, the National Scientific Medical Center, the Scientific Center for Pediatrics and Pediatric Surgery. The number of telemedicine consultations is increasing every year.

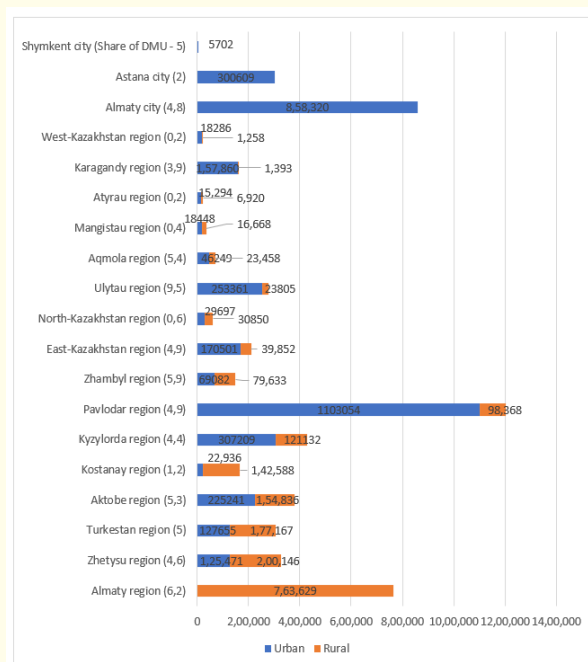
No	Regional hospitals, Republican clinics	Number of telemedicine centers	Actual number of telemedicine consultations/year	Number of attached surveys		
				X-ray	ECG	Ultrasound
<b>I. Telemedicine centers of regional hospitals</b>						
1	Aqmola region	15	2298	411	1559	
2	Almaty region	13	870	309		
3	Aktobe region	7	259	42	98	
4	Atyrau region	7	397	8	17	
5	Zhambyl region	8	749			
6	West - Kazakhstan region	9	1782	152	190	33
7	East - Kazakhstan region	8	375	127	51	
8	Karagandy region	11	2741	382	251	176
9	Kostanay region	15	1540	55	99	5
10	Kyzylorda region	8	1233			
11	Pavlodar region	11	575		5	
12	Mangystau region	6	753	171	44	90
13	North - Kazakhstan region	12	1741		15	17
14	Turkestan region	14	3928			
	Total:	144	19241	1657	2329	321
<b>II. Telemedicine centers of Republican clinics</b>						
1	National Scientific Medical Center	1	342			
2	Scientific Research Institute of Cardiology and Internal Medicine	1	716	109	815	306
3	Scientific Center for Obstetrics, Gynecology and Pediatrics	1	83		5	68
4	National Research Center for Motherhood and Childhood	1	308			
5	Research Institute of Traumatology and Orthopedics	1	92	33		
6	Kazakh scientific center of dermatology and inf diseases	1	82	3	7	6

7	Scientific Center of Pediatrics and Pediatric Surgery	1	481			
8	Kazakh Research Institute of Oncology and Radiology	1	68	12	11	54
9	National Scientific Center of Surgery named after N.N. A.N. Syzganov	1	76	67	61	123
10	National Research Center for Phthisio-pulmonology	1	263			
11	National Center for Neurosurgery	1	149			
12	National Scientific Center of Oncology and Transplantation	1	102			
	Total:	12	2762	224	899	557
	Total:	156	22003	1881	3228	878

**Table 1:** Telemedicine centers of regional hospitals, Republican clinics.

According to table 1, in 2019, regional hospitals and Republican clinics conducted 22,003 telemedicine and video consultations. Of these: 19241 consultations were held by regional hospitals, 2762 - by Republican clinics. 1881 radiographs, 3228 electrocardiograms and 878 ultrasound examinations were deciphered. In 2022, the number of remote medical services provided, including telemedicine consultations to the population, is 5,729,758.

In 2022, the number of distance medical services provided, including telemedicine consultations to the population, is 5,729,758.



**Diagram 2:** The number of distance medical services provided in 2022 year (according to the Ministry of Health of Republic of Kazakhstan information).

A telemedicine network “Doctor-doctor” has been developed, thanks to which citizens can get advice from 20 specialized doctors medical institutions. The largest number of telemedicine consultations was provided in such specialties as:

- Functional diagnostics - 3013 consultations (15.8% of the total number of consultations);
- Cardiology - 1762 consultations (9.2%),
- Pulmonology 1473 consultations (7.7%).

On May 13, 2022, Nur-Sultan (Astana) hosted the 1<sup>st</sup> international industry forum on telemedicine and e-health in Kazakhstan, where trends and opportunities for the use of modern technologies, joint search by the state, business and the scientific community for constructive solutions in the field of telemedicine technologies were discussed.

### Results

The development of telemedicine in Kazakhstan made it possible to make medical assistance available and reduced the burden on medical institutions. Telemedicine has become a key component in strengthening the health care system and achieving the goal of universal health coverage in Kazakhstan. Scaling up the use of telemedicine requires a multi-faceted approach, including defining appropriate use, applying standards, providing training for health professionals, developing appropriate policies, and integrating health information. The use of telemedicine should not pose health risks to citizens. A medical worker who provides consultations within the framework of telemedicine care must have guarantees and be responsible for their actions. Now telemedicine is not an independent type of medical care, but is only an information and communication interaction between a patient and a doctor. Telemedicine has proven its effectiveness and requires further development as part of the digitalization of healthcare in Kazakhstan. Special regulatory regulation is required, which takes into account the observance and guarantees of the rights of citizens (protection of the patient’s personal data, observance of medical confidentiality). When developing normative acts, the requirements for developers of telemedicine systems, their operators, companies (service maintenance) should be approved. It is necessary to introduce “Informed voluntary consent to a consultation using remote medical technologies”.

An important aspect of the successful introduction of telemedicine in world practice is adequate financial incentives for medical personnel to actively provide the medical services in question. Public-private partnerships can be useful in scaling up telemedicine and implementing patient-centred integrated care frameworks, but the public interest must be properly protected. Information and communication technologies can help address previously unsolvable policy challenges, such as the access of rural populations in large, sparsely populated countries to health care and specialized care.

### Conclusion

The development of telemedicine in Kazakhstan made it possible to make medical assistance available and reduced the burden on medical institutions. Telemedicine has become a key component in strengthening the health care system and achieving the goal of universal health coverage.

### Disclosure Statement

The authors declare that there are no conflicts of interest.

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