

TELEMEDICINE: INTEGRATION OF INFORMATION AND COMMUNICATION
TECHNOLOGIES INTO MODERN MEDICINE

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Abstract: In the context of the global digital transformation of medicine, new forms of medical care are being widely implemented. This concerns not only medical equipment and access to medical services but also the entire healthcare system and the relationship between doctor and patient. Modern medicine is unimaginable without digital solutions. The digitization of existing information and its availability to all participants in the “doctor–patient” system form the basis for the further development of clinical practice, revolutionary scientific research, improvement in patient-centered care quality, and effective functioning of the system for people. This requires a shared culture of values and ethical standards corresponding to digital solutions. The article analyzes the reasons for the increased relevance of remote communication forms between doctor and patient during the COVID-19 pandemic, using telemedicine as an example. The main types of telemedicine in the current conditions, driven not only by the pandemic but also by the digital transformation of medicine, are examined. Special attention is given to the possibilities of telemedicine in terms of its advantages, as well as the legal and ethical aspects from the perspective of risks. **Keywords:** telemedicine, doctor–patient relationship, digital transformation of medicine, advantages, risks, ethics, legislation

Telecommunication technologies have existed in human life for a long time and are not a product of today or yesterday. However, the strict restrictions introduced during the COVID-19 pandemic, which has been called the "Black Death of the 21st century," forced society to radically rethink forms of interaction, minimizing personal contact. As a result, remote forms of communication began to develop rapidly. The COVID-19 pandemic made people look at both domestic and international forms of communication in a new way, significantly influencing the organization and pace of development in all spheres of human activity and prompting the search for new ways to build interpersonal relationships. In such conditions, healthcare became one of the most in-demand fields, as people continued to suffer from various illnesses and required constant medical care. At the same time, the need for new forms of safe interaction, compliant with epidemiological requirements, increased significantly. Thus, telemedicine occupied a niche as an alternative and necessary form of communication between people.

Relevance:

Telemedicine consultations are currently an important and relevant direction in modern medicine. These consultations can be conducted in real time (synchronously) or with a delay (asynchronously). Online consultations require high-quality technical equipment and provide effective results. Remote medical consultations enable doctors to exchange

information, assess the patient's condition, discuss medical situations, and reach joint clinical decisions. This approach is especially important in acute and complex medical conditions, absence of traditional symptoms, or when a patient has severe complications.

Delayed consultations also prove effective. They are conducted by highly qualified specialists from leading medical centers. Asynchronous telecommunication approaches are often used for analyzing results of visual diagnostics (e.g., X-rays, ECG, spirometry) and for dynamic assessment of the patient's condition.

Within the framework of the "National Healthcare Project," developed at the initiative of the President, the implementation of the telemedicine subsystem aims to achieve the following strategic goals:

Reduce mortality rates among the working-age population to 350 cases per 100,000 people;

Reduce mortality from cardiovascular diseases to 450 cases per 100,000 people;

Reduce mortality from oncological diseases to 185 cases per 100,000 people;

Reduce infant mortality to 4.5 cases per 1,000 live births.

Additionally, the project plans to reduce staffing shortages in primary healthcare facilities, ensure equal access to medical services for all population groups including residents of remote areas, and optimize the healthcare system.

It is important to note that telecommunications in medicine are not a novelty. The first remote medical consultation for children was conducted in 1924. In subsequent years, telemedicine consultations were used to monitor the health of sailors and astronauts. Since the 1990s, doctors have actively used the Internet for remote patient monitoring, as well as for storing and transmitting medical information.

Telemonitoring is especially effective for managing patients with heart disease, diabetes, and those participating in clinical trials.

It is important to emphasize that the use of telemedicine consultations should be a free choice of both doctor and patient; this right should not restrict the patient's ability to receive traditional medical care but rather complement it. Access to medical services should not be limited. The use of telemedicine consultations is not an attempt to avoid personal meetings with patients but represents a necessary solution in cases of epidemiological or logistical reasons. Thus, telemedicine consultations are considered not as a separate type of medical activity but as a technological tool supporting existing practice.

In Uzbekistan, these services are funded within the framework of the compulsory medical insurance system. This funding is carried out based on special tariff agreements between regional compulsory medical insurance funds, government management bodies, and

insurance companies. There is also the possibility of using additional medical insurance and personal funds of the population to obtain these services.

The World Health Organization notes that telemedicine is the use of information and communication technologies to provide medical services, including diagnosis, treatment, and disease prevention; conducting diagnostic tests and evaluating results; as well as ensuring continuous professional development of medical specialists and the growth of the professional community.

Among the widely used information and communication technologies in medicine, telemedicine is the most effective method. It supports clinical decision-making, management of material and intellectual resources, logistics and integration between medical institutions, and optimizes interaction between levels of medical care. Telemedicine contributes to the standardization of the quality and accessibility of medical services. Especially in cases where geographical remoteness is an obstacle to obtaining medical care, telemedicine becomes an indispensable tool.

It is implemented in two main directions:

The "doctor–patient–relatives" system;

Interaction between medical professionals.

In the "doctor–patient" system, the following main types of telemedicine are distinguished: remote (online and asynchronous) medical consultations — primary, specialized, high-tech, emergency, or palliative; home monitoring (especially for remote and hard-to-reach areas); as well as services for special population groups requiring constant medical supervision (military personnel, professional athletes, clinical trial participants).

Advantages

Telemedicine communication has several advantages compared to traditional in-person doctor visits. It is especially effective when the patient is located in hard-to-reach areas, providing access to quality medical care for patients from various regions, and it is economically beneficial. Given the rising healthcare costs in many countries (for example, in the USA, healthcare spending reached 20% of GDP in 2020), telemedicine contributes to cost optimization, saving time for doctors and patients, increasing the efficiency of medical institutions, and reducing the number of medical errors [12].

However, the development of telemedicine requires significant expenses and faces financial, technical, and cultural limitations. The financial factors include costs for purchasing equipment and expensive software. Computer literacy of doctors and patients, as well as their ability to use the equipment, remain a challenging issue. Additionally, it is important to organize training for all participants in therapeutic and diagnostic processes, provide technical support, and ensure the necessary infrastructure is in place. Logistical limitations are related to the accreditation of this type of medical care [13].

Telemedicine consultations conducted via the Internet are associated with the risk of data leaks, for which the medical institution providing the consultations is responsible. Currently, there are no clear requirements for the servers where medical data are stored, nor for the procedures granting access to this data. The use of data storage and encryption systems is necessary, as well as the implementation of other measures to ensure the protection of personal information during its processing and storage. However, appropriate legislative regulation on these issues is still lacking [25].

Moreover, given the difficulties doctors face when working independently with information technologies, they are forced to rely on intermediaries—operators. Requirements for operators who provide patients access to telemedicine services (such as providing information about medical institutions, scheduling online consultations, storing materials, receiving and transmitting data, and so forth) are only partially regulated [26]. It should be noted that operators are not medical professionals and must ensure protection of data against unauthorized access, destruction, alteration, blocking, copying, provision, and dissemination. However, they do not bear responsibility for breaches of confidentiality [27]. These problems worsened during the COVID-19 pandemic [28].

Conclusion

A distinct ethical issue is patient identification. Determining the identity of the person who gave consent for telemedicine services presents significant challenges. According to legislation, informed consent can be expressed either in written or electronic form. Electronic consent implies a document signed with an enhanced qualified electronic signature or a simple electronic signature created using a certification authority (USIA), or an enhanced qualified electronic signature of the physician [18]. The process of obtaining such a signature is complex, which negatively affects the willingness of patients and healthcare professionals to use these services, slowing the development pace of telemedicine. Moreover, there is a risk that a patient's account may be used by third parties, calling into question the authenticity and awareness of the consent, especially concerning elderly individuals, people with substance abuse and mental health disorders, and other vulnerable groups. The issue of anonymous consultations, which have high demand, remains unresolved. A telemedicine patient must log in exclusively through a personal account on the government services portal, which excludes the possibility of anonymity.

Thus, telemedicine as a communication technology simplifying interactions between people occupies an important place and continually expands its field of activity. At the same time, many unresolved ethical and legal issues remain, requiring in-depth study and development for the further effective advancement of this field.

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