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**CONCEPT REVIEW OF EHEALTH DEVELOPMENT IN UKRAINE AT
THE CURRENT STAGE**

Taktashov Hemadii Saitovych

MD, PhD, Professor,
Head of the Department of Internal Medicine №2

Petriaeva Olena Borycivna

PhD of Public Administration,
Associate Professor,
Associate Professor of the Department
of Higher Education, Health and Hygiene Management

Hrona Nataliia Vasylivna

PhD, Associate Professor,
Associate Professor of the Department of Internal Medicine №2

Voloshyn Yaroslav Volodymyrovych

Assistant of the Department of Internal Medicine №2

Suprun Oleksandr Oleksandrovyh

PhD, Associate Professor,
Associate Professor of the Department of Internal Medicine №2
Donetsk National Medical University, Liman, Ukraine

Summary: the concept of eHealth in Ukraine is based on the formation of a roadmap for the development of the system taking into consideration the current status, existing and possible problems. The ways to positive reform achievement are in the area of improving and quality implementation of regulatory and legal framework, resource, organizational, management and technical support along with the implementation of security and availability of e-health.

Key words: eHealth, medical reform, medical information technology, health care, eHealth development concept, electronic medical documentation

Problem statement. The electronic system of health care (eHealth) is an integral part of the development of medical reform which changes the principles of providing and financing health care in our country. In general, eHealth is a set of

information services in the field of health care and person's daily life to maintain and enhance health and create conditions for quality of life. eHealth covers various areas of health care such as medical practice, ongoing professional development of doctors, management of medical institutions, medical law, pharmaceutical, information services for patients, etc. eHealth allows you to keep record of concluded contracts between doctors and patients, provides access to the information about the health of each patient. eHealth should provide the heads in the field of health care with the management of the field, rational allocation and efficient use of medical and financial resources of the state, create conditions for transparent competition at the market of medical services [1, 2, 3, 4].

The purpose of the work. Conducting a review of eHealth state to date, assessing the course and quality of implementation of the process components, identifying existing problems, ways and methods of solving them based on the analysis of data from various information sources.

The main part. According to the analysis of eHealth development, its implementation began in the summer of 2017. Initially, it was possible to store only such personal data as the register of medical institutions, doctors, patients. The first version also gave the possibility to register the agreements between medical institutions/doctors and the Center of the National Health Service of Ukraine and the declarations between a primary care physician and a patient. In the period of 2019-2020 electronic medical histories were created including the records of electronic prescriptions and electronic referrals, under "Available Medicines" program there were launched reimbursement and aggregation of disease statistics [5]. On December 28, 2020 the Cabinet of Ministers of Ukraine (CMU) approved a new Concept for the Development of the Electronic Health Care System. The purpose of this Concept is to form a roadmap for the development of eHealth system in Ukraine which takes into account the interests of patients, doctors, authorities, the public, business representatives, international organizations and other stakeholders [6, 7, 8]. The implementation of the Development Concept is expected in two stages until 2025.

In 2020-2022 at the first stage it is planned to provide stable resource support;

improve legislation and develop eHealth management systems and mechanisms; conduct the analysis and improvement of existing information and telecommunication systems and registers; ensure continuity, sustainability of protection and security of information and personal data; make a transition from paper to electronic medical records; form a single medical information space; expand eHealth functionality using international medical and information standards; inform health care institutions, introduce digital competencies, cybersecurity and cyberhygiene of health workers and patients; ensure transparency and public availability for the development and use of eHealth; develop a technical platform for effective interaction of electronic medical information systems, integrate it into the global medical information space.

In 2023-2025 at the second stage it is expected to enhance the development of clinical decision support systems, personalized medicine, telemedicine, big data processing systems, artificial intelligence - engineering processing, use and acquisition of new knowledge; support for standardization, technical regulation of electronic medical information systems, implementation, maintenance and updating of dictionaries and classifiers; strengthening of staff capacity in the field of health care and full integration of the requirements of the conceptual and reference framework of digital competencies of health workers to professional standards.

During 2017-2021 a number of systemic changes and digital transformations in health care took place, namely the Law of Ukraine “On State Financial Guarantees of Public Health Care”, the Resolution of the Cabinet of Ministers “Some Issues of Electronic Health Care System” and other legal documents were adopted [9, 10] where eHealth and digital tools were identified as fundamental ones for the development of that area.

During this period the key processes and registers necessary for the existence of a health information environment were developed and a market for specialized software developers began to form providing access to the central eHealth database (in 2021 there were more than 39 medical information systems).

Currently, eHealth ensures electronic declarations with family doctors, giving

e-referrals and electronic prescriptions under “Available Medicines” program, keeping an electronic medical history and so on. However, there are still a number of challenges to ensure patient’s access to personal data management, as well as the quality, safety and availability of health services, namely there is a deficit of resource provision in the context of the lack of a coherent eHealth functional development plan, the need to improve existing components and implement new ones. At the same time, there are paper and electronic forms including two routes for the patient which often contradict each other.

It should be noted that Ukraine is one of the leaders in the field of software development. There is also positive experience regarding the implementation of e-government, e-procurement system, e-interaction system of state electronic information resources, the only state web portal of electronic services “Portal Diya” that creates favorable conditions for the development and implementation of technical solutions in the field of information and communication technologies and health care.

The current stage of eHealth is characterized by the lack of compatibility of information and telecommunication systems in the field of health care, imperfection of information and network infrastructure and interaction between national registers, imperfection of a number of registers, lack of specialists for automation and change management. The level of computerization, high-speed Internet connection, digital competence of health-care workers remains insufficient.

On the one hand, these circumstances are challenging and, on the other hand, they provide opportunities for rapid development, as there is no need to process historically accumulated information and telecommunications systems and there is an opportunity to join the development and implementation of modern technologies immediately.

The main problems of eHealth that need to be solved today are lack of standardized and timely quality information about the patient's health that leads to duplication of consultations, laboratory tests and other medical services at different levels of medical care; primary medical information is stored by various health care

providers, mainly in paper form, that leads to administrative burden on health workers and significant time spent; lack of qualified medical staff, disproportionate territorial distribution of specialists (concentration in large cities, deficit in rural areas); underdeveloped national medical infrastructure of informatization, in particular, staffing capacity and level of digital competence of health workers, the state of computerization of health care institutions; collection and production of medical statistics are interrupted in the process among themselves, there is no reliable validation and verification of primary data used for the formation of statistical reporting.

The ways and methods of solving problems. To solve the problems that affect the development of eHealth it is necessary to ensure the implementation of comprehensive measures in the following areas:

- regulatory and legal support;
- resourcing;
- organizational, management and technical support of eHealth development;
- providing eHealth quality, security and availability.

Regulatory and legal support for eHealth development is based on a number of laws and regulations and should be carried out through the formation and implementation of public policy in compliance with the following priorities and areas:

- improvement of legislation on eHealth development and modernization of existing tools;
- transition from the use of paper to electronic documents;
- improvement of the approaches to electronic identification, user authentication;
- ensuring the integration and electronic interaction of eHealth with other information and telecommunication systems;
- settlement of the issue of personal data processing, in particular those ones that are a special risk to the rights and freedoms of personal data subjects (health data);

- harmonization of national standards with world-wide standards and classifiers, introduction of internationally recognized and widespread standards in Ukraine for further integration with the world information space.

eHealth resource development is provided by:

- ensuring stable resource support through budget funding, attracting international technical assistance and implementing public-private partnerships;
- ensuring financial transparency and public availability of aggregated data;
- formation of a broad coalition with the participation of all stakeholders (representatives of state bodies, local governments, civil society, health care institutions, the information and communication technology industry, the media);

Organizational, management and technical support of eHealth development. For coordinated development it is provided an organizational and managerial model that includes:

- maintaining eHealth functioning, determining the directions of its development and realization of other functions defined by laws and other regulations by NHSU;

- ensuring uninterrupted work of the central database by the administrator of eHealth central database;

- involvement of the business community, international organizations, experts and civil society in the formation of public policy and strategic planning and identification of eHealth directions.

Once the health care financing reform is completed, eHealth organizational and management model should be analyzed and reviewed for its effectiveness and appropriate actions should be taken if necessary.

Organizational and management support of eHealth development is carried out by implementing the following approaches:

- harmonious development of the two-level eHealth model that consists of the components ensuring the automated exchange of information, data and documents through an open software interface (API), namely: central component (central database) and peripheral component - information and telecommunication systems

that allow to automate processes in the field of health care;

- placing key registers and directories at the state level in the central database;
- providing patients with the access to their personal data and other eHealth functionality through the patient's online personal cabinet;
- introducing an integrated electronic medical history which is a systematic and standardized list of the patient's medical records in electronic form in various health care institutions;
- identifying eHealth technical architecture as a service-oriented one and providing the ability to respond flexibly to changing needs in the process of development and scaling taking into account the speed of technical progress.

eHealth quality, security and accessibility are ensured by

- taking into account the principle of technology neutrality and independence from solution developers when developing eHealth;
- recording any actions in the system without having any possibility of deleting or correcting the entries;
- having the patients' right to review and verify the available facts of other users' access to their personal medical information, as well as to manage the possibilities of such access;
- ensuring cybersecurity, monitoring, protection and analysis of possible interventions, losses, damage;
- using modern means of electronic identification and authentication with a high level of trust;
- compliance with international ISO/IEC standards;
- ensuring the availability of e-health for users-patients with visual, hearing, musculoskeletal, speech and intellectual disabilities, as well as with various combinations of disorders in

accordance with DSTU ISO/IEC 40500: 2015 "Information technology. W3C Web Content Accessibility Guide (WCAG) 2.0";

- encouraging researches in the fields that have a direct impact on the development of eHealth;

Conclusions. Qualitative realization of a set of measures to solve the problems of the development and implementation of eHealth will allow to achieve the expected results in terms of quality, safety and availability of medical services in medical diagnostic centers and medical institutions as for a single medical information space and the development of IT innovations; interoperability, integration and harmonious interconnection with related areas will be ensured; staff capacity will be strengthened in the field of health care and the level of digital competence of health professionals will be increased; the efficiency of management and use of resources, transparency and public availability will be improved; investment attractiveness, business climate and competitiveness will be also improved.

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