THE INTRODUCTION OF THE DISCIPLINE OF MEDICAL INFORMATICS IN THE EDUCATION OF MEDICAL STUDENTS

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ABSTRACT

The article is devoted to the analysis of the development of medical informatics in Uzbekistan. The historical stages, the current state and prospects of development are considered. The key problems are highlighted and solutions to overcome them are proposed. Special attention is paid to the role of information technology in improving the quality of medical care and healthcare organization.

Keywords: Medical informatics, Uzbekistan, healthcare, information technology.

INTRODUCTION

Medical informatics is an interdisciplinary field that combines medicine and information technology. It focuses on the collection, analysis, and use of medical data to improve diagnosis, treatment, and healthcare organization. This article examines the history of medical informatics, its current state in Uzbekistan, and its future prospects. Medical informatics is a young science, as this discipline has only recently received a formal education system to support and elevate it to a scientific field. The evolution of this discipline began with the evolution of informatics, more precisely, cybernetics. At the turn of the 19th century, after informatics was singled out as a separate discipline, its rapid development and implementation in all sciences began. Informatics permeates all spheres of human life now, but then it slowly penetrated fundamental scientific branches.

The development of its own methodology is a characteristic of a new science. However, medical informatics does not use a unique methodology. Specific applications in medicine have led to a mixture of interdisciplinary methodologies and the application of formal methods in an empirical discipline [3].

The medical aspects of the methodologies considered necessary for establishing medical informatics as a scientific discipline are as follows:

• The method of data collection for evaluating tests in terms of objectivity, sensitivity, reliability, and value;
• Analysis of the information content of data;
• Analysis and formal processing of medical conclusions and actions;
• Evaluation of the usefulness of medical decisions and actions;
• Regulation of the theoretical concept of cause-and-effect relationships between objects and processes;
• Systems analysis in healthcare: modeling and simulation.

By linking medical science and disciplines with technologies, as well as disciplines in information and computer science, methodologies are created through which these technologies and disciplines can contribute to the adequate use of the medical knowledge base and the provision of better healthcare. It should also be noted that, using the methods of medical informatics, the technologies that are part of the broad field of medical informatics are being revised, such as the evaluation of diagnostic technologies (computer-aided or not) and the evaluation of the information system.

Medical informatics (MI), compared to medicine, is very young. Its foundation lies in information systems used in medicine. The need for further research in MI and biomedical informatics to support other scientific areas is growing. This work will show the chronology of the development of this discipline [1].

MATERIALS AND METHODS

The method of presenting historical chronology employs a classical style, that is, a step-by-step description of the development of events.

It all began in the post-war period, with the USA as the leading nation in computer science, leading to their application in medicine. Subsequently, the internet triggered a new information revolution, as medical information became publicly accessible and no longer under the exclusive control of healthcare professionals. The development of information technology gave rise to fields such as telemedicine and cybermedicine [2].

In the 1950s, new terms such as "electronic data processing," "automatic data processing," "information processing," "software development," and "computer technology" with a medical aspect first appeared. The integration of medicine and IT was expected to lead to increased productivity and reduced errors. Guided by R. S. Ledley's publication in the late 1950s, which presented an overview of the integration of computer technology in biology and medicine, and thanks to other works by Ledley and L. B. Lusted, the US National Institutes of Health undertook the first major attempt in the history of the global economy to introduce computers into biology and medicine through the total computerization of the national healthcare system. In Germany, research in the field of MI was led by Dr. Gustav Wagner, founder of the German Society for Medical Documentation, Informatics, and Statistics, and Peter Leo Reichertz. The society became the world's first professional informatics organization. In Great Britain, the pioneers of medical informatics were William Abbott and John Anderson; in France, François Grémy; in the USA, Morris Collen; in the former Yugoslavia, Gjuro Deželić, and others [1].

In 1995, Ferguson introduced the term "consumer health informatics" as a new generation of medical information systems serving both physicians and patients. Consumer health informatics (CHI) is a branch of medical informatics that analyzes consumer health information needs, studies and implements methods for providing health information to consumers, and

models and integrates consumer preferences into health information systems. CHI sits at the intersection of several disciplines, including nursing informatics, public health, health promotion, medical education, librarianship, and communication science; arguably making it the most complex and rapidly evolving area of medical informatics. CHI is applicable to all consumers, regardless of age, ethnicity, gender, and socioeconomic status [4].

The development of this field in the CIS countries was spurred by "Medical Cybernetics," which emerged in the 1950s.

Starting in the mid-1960s, the fundamental conceptual principles underlying the integration of information technology (informatization) into healthcare were formulated, and the first projects were implemented at all levels of industry management. Specifically, in 1966, the Institute of Cybernetics of the Academy of Sciences of the Uzbek SSR was established under the leadership of Academician V. Kabulov, which served as an impetus for the development of medical informatics in Uzbekistan. The period from 1975 to 1985 can be characterized as the time of creating a state system for organizing and coordinating work on the introduction of informatics methods and computer technology into practical medicine, establishing regional medical information and computing centers (currently - medical information and analytical centers) in the regions, subordinate to regional healthcare management bodies. In the mid-1980s, to better coordinate the development of computer technology in healthcare at the regional level, a Council of Directors of Information Computing Centers (ICCs) was created, which was successfully headed for a long time by Professor G.I. Chechenin. By the mid-1990s, the need for informatization of the industry was no longer in doubt at all levels of healthcare management. As this science developed, new terms were coined, such as: medical computer science, computational medicine, medico-electronic data processing, medico-automatic data processing, medical information processing, medical information science, medicine and engineering equipment, and medical computer technology, and telemedicine.

At the conference on the history of Medical Informatics held in Prague in April 2013, George Michaelas identified the following stages of development:
a) Early Medical Informatics (before 1975): pioneering work by scientists, significant work on analog information signals, laboratory applications, early attempts at decision support, databases, modeling and simulation of biological processes, biostatistics;
b) Development of MI (1975-1990): the creation of international and national organizations allowed for the systematization of the main areas of MI, initially specializing in the development of methodologies, medical history, hospital information systems (HIS), support for expert systems;
c) Consolidation of MI (1990-2000): the field is established as an independent discipline. It becomes clear that the object of study is medical technical information; implementation of hospital information systems (HIS) and new technologies such as telemedicine.
d) Formation of MI (2000-2010): a clearer definition of e-health's ability to solve the main problems of modern healthcare, the influence of the Internet on medicine; the involvement of policymakers, expansion of regional and national projects, e-health as a business, patient-centered MI, the emergence of sub-disciplines: bioinformatics, etc.

Prospects of informatization of healthcare in Uzbekistan.
According to the Presidential Decree of the Republic of Uzbekistan No. UP-5590 of December 7, 2018, a concept for the development of the healthcare system of the Republic of Uzbekistan for 2019-2025 was developed [5].

This concept incorporates approaches based on the recommendations of the World Health Organization (WHO) and the experience of leading countries that have achieved significant success in reforming their healthcare systems.

The concept's objectives are:

1. To increase life expectancy by improving the outcomes of prevention and treatment of diseases and conditions that cause most premature deaths and disabilities.

2. To reform the healthcare financing and organizational system to ensure equitable access to healthcare, financial protection for the population, and fair resource allocation.

3. To strengthen the capacity of healthcare management bodies and enhance the role and responsibility of their leaders in implementing the concept's objectives and improving the quality of healthcare for the population.

The concept's tasks are:

1. To ensure comprehensive legal regulation of the sector, implementing international standards and recommendations of the WHO.

2. To develop mechanisms for effective inter-agency interaction and cooperation in the field of public health, including addressing issues negatively impacting social and economic determinants of health, developing a healthy and safe environment, improving water supply and sanitation, promoting healthy nutrition (including for infants and children), and fostering healthy lifestyles.

3. To strengthen the public health system, including the development of sanitary-epidemiological services, improving the system for monitoring infectious and non-infectious chronic diseases, and implementing and complying with International Health Regulations.

4. To reform the district level of healthcare to ensure effective integration of primary and secondary healthcare facilities, emergency medical services, strengthen maternal and child health, improve specialized care, and develop palliative care.

5. To improve the healthcare financing and organizational system, legally enshrining the state-guaranteed volume of free medical care and the phased introduction of mandatory health insurance.

6. To develop the private healthcare sector, public-private partnerships, and medical tourism, creating favorable conditions and improving the competitive environment to attract investment in healthcare.

7. To improve the organizational structure of the healthcare system, the central apparatus of the Ministry of Health of the Republic of Uzbekistan, and its territorial management bodies, with a clear delineation of functional tasks and areas of responsibility.

8. To phase in a system for accrediting medical and pharmaceutical organizations, as well as licensing medical and pharmaceutical activities.

9. To further develop the pharmaceutical industry, harmonize the procedures for registering new medicines, medical devices, and medical equipment with international standards, improve pricing mechanisms, expand the volume and range of production of medicines, medical devices, and medical equipment, and implement systems for their labeling and tracking.

10. To create an effective system for training, retraining, and professional development of medical personnel, and to develop medical science, including based on the certification (accreditation) of scientific and educational medical institutions according to international standards, introducing modern educational programs, methods, and technologies.

11. To widely implement "e-health" systems, creating a complex of information systems and databases integrated on the basis of unified national standards.

CONCLUSION

Medical informatics plays a crucial role in modernizing Uzbekistan's healthcare system. Despite the achievements made, challenges remain that require attention. Further development

of medical informatics will enhance the quality of healthcare, reduce costs, and improve public health.

Medical informatics in Uzbekistan demonstrates steady growth and development. The integration of information technology into healthcare improves the quality of medical services, optimizes management processes, and expands access to healthcare for the population.

However, despite these achievements, certain challenges persist, including insufficient integration of information systems, a shortage of qualified personnel, and cybersecurity concerns. To overcome these limitations, increased government support, investment in specialist training, and the development of national standards and strategies for the development of medical informatics are necessary.

A promising area of development is the widespread implementation of artificial intelligence, the advancement of telemedicine, and personalized medicine. Medical informatics can become a powerful tool for addressing pressing healthcare issues in Uzbekistan, such as chronic diseases, oncological diseases, and others.
Overall, medical informatics holds immense potential for improving public health and increasing the efficiency of Uzbekistan's healthcare system.

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