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Mathematics in Medical Education

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Abstract: *This paper investigates major points of the Mathematics in medical education. On this case, research has been pinpointed on both theoretical and methodological points of the medical education. In conclusion, research has noticed outcomes and shortcomings of the issue with the clear recommendations for the further.*

Keywords*: Mathematics, medical education, research, points, world experience, medicine, teaching.*

I. INTRODUCTION

The vector of development in modern society increasingly indicates the need for the economy to transition to a new technological mode, where those countries and regions will lead that knowledge-based high-tech production will effectively operate. Specifically, it is knowledge that is the main basis on which the progress of all aspects of society, including education and health will be based.

The Government of the Russian Federation, on behalf of President Vladimir Putin, after a series of summit meetings, is preparing a state program for the development of healthcare in Russia until 2030, in which 116 billion rubles are allocated to improve medical education in the country and the total volume of this program is simply ambitious - 1.3 trillion rubles.

Workers in the sphere of education of medicine, in this regard, need to look for new approaches and technologies in education at different levels - from the secondary special to its highest level based on original ideas and complex research methods, often come into sight at the intersection of medicine and other fundamental sciences.

There are sciences in the structure of knowledge, the methods and achievements of which are universal in nature, that is why they are widely used in other areas of society. This can be said with confidence about mathematics, which has general methods of cognition, both fundamental and applied.

Obviously, that person is considered to be the subject, producer and speaker of knowledge and problem will appear in maintaining a state of his life in this case as famous poet said, he could create, invent and try.

Medicine is formed to assist a person keep healthy throughout his life and therefore, during his active life in society. For this purpose, she must use all the modern achievements and methods of other sciences must be used to preserve and prolong the state of health. Consequently, the creative activity of members of society to work on the production of knowledge that ensures its progress.

It is generally known that at the junction of sciences new ideas are often born, new complex disciplines appear that contribute to the development of knowledge, therefore, the use of mathematical methods as a tool for improving and progressing medicine does not raise any doubt.

The aim of this work is to describe the possibilities of using mathematical methods in medicine, starting with the training of physicians in elementary mathematics and ending with the formation of knowledge in higher mathematics among graduate students, for their use in the study of living organisms, in particular the human bodyas open systems.

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It is known that the duties of health care providers include: measuring the patient's body temperature, measuring blood pressure, calculating the correct dosage of drugs depending on the patient's weight. For the correct administration of drugs, it is necessary to define the proportion of the solution and mix the drug before injection, etc.

For this reason, a survey conducted among more than a hundred students in ninth grade in a Moscow high schools on the theme: "What`s your opinion in what areas of life mathematics plays a most important role?" And the answer "in medicine" was given only by a small number of students. However, after finishing general secondary school they go to study medicine at medical institutions of secondary special education and possibly, further to medical universities.

Even greater interest is the answer of the same students to the question: "What topics of the school course of mathematics are found in medicine?" The answer was: addition and subtraction - 78%, proportions - 46%, volumes - 36%, solving equations - 10%, diagrams - 23%, statistics - 67%, arithmetic progression - 6%.

Need to say that, almost any medical worker will confirm that he often remembered and used the same multiplication table or the rules of action with rational numbers; applied proportions when calculating the concentrations of medicinal solutions; used vessels of different volume or capacity, for example, for droppers; collected data, for example, for diagnosing a disease from the results of analyzes presented in the form of different tables and diagrams; applied statistics.

Consequently, the answers of schoolchildren as a whole correctly reflect the fields of application in real medicine of different sections of elementary mathematics.

However, if we compare these answers with the content of work programs in the discipline "Mathematics: algebra and the beginnings of mathematical analysis; geometry" of some colleges of biomedical profile, their partial discrepancies will become visible.

For example, the section related to actions on numbers is cut from geometry, the topic "Volumes and surfaces of geometric bodies" is removed. The most important topic of the beginnings of mathematical analysis - "The antiderivative and the integrals" was reduced to 8 hours. Together with the basics of probability theory, only 10 hours are allocated to mathematical statistics.

As a result,there are programs that resemble a patchwork quilt, that is without a single concept. They devoted too little time to solving practical problems with numbers, proportions and percentages. Information on the surfaces and volumes of geometric bodies has been removed from geometry. All that remains is the task of determining the individual elements of volumetric bodies, which does not contribute to the formation of a holistic spatial concept of the volume and surface of a geometric body for a student to study.

However, it is holistic spatial thinking that exactly provides food for logical reflection on the spatial relationships of geometric bodies and therefore, it is necessary to solve creative problems in your profession.

In particular, to represent the human body as an open system that exchanges mass and energy with the external environment, it is necessary to study the effect on the body of both external influences and the internal responses of individual systems and organs, which can be diagnosed as the initial stages of serious diseases of the internal organs and reflected in the form of instrument readings through changes in individual body parameters.

The description of such complex systems is possible only with the use of mathematical models represented by systems of differential and integral equations. However, there is not enough time for the formation of skills for differentiation and integration of even elementary functions in programs.

As a result, taking into consideration a decrease in the general level of knowledge in mathematics among applicants, it is possible to offer when studying a course in mathematics, at first to master the basic level of knowledge in elementary mathematics and only then - the beginning of mathematical analysis, the basics of combinatorics, probability theory and mathematical statistics.

Such astatement of the course of mathematics will help maintain a unified concept of discipline, which will contribute to the formation of sustainable skills, and therefore, general educational and professional competencies of

students, according to the Federal State Educational Standard of Higher Education for nurses. As a result, a foundation of knowledge will be created for in-depth study by students of other natural sciences and special disciplines.

Considering the possibilities of using higher mathematics in medicine, it should be noted that the authors' work in the field of technical sciences led to the need to search for a mathematical description that reliably reflects external influences on processes in liquids and solids i.e. in condensed matter [1,2,3].

While studying this problem, great help was provided by the original work of Nobel laureate I. Prigogine and his Dutch-Belgian school on the application of mathematical analysis and modeling in the field of thermodynamics of irreversible processes of open systems [5,6].

As a result of modeling the above processes in technical systems, in particular in metallurgy, in view of the universality of mathematical models, in our opinion, the possibility arises of extending such mathematical modeling to living organisms, presented as open systems. These systems exchange mass and energy with the environment and function in a state of disequilibrium [5,6].

One of the first scientists to reasonably prove the imbalance of living systems (living organism) was the Soviet biologist E.S. Bauer, who wrote back in 1935: "... living systems are never in equilibrium and, due to their free energy, perform constant work against equilibrium ..." [4].

Hence, a living organism is a macroscopic open system, far from equilibrium, i.e. dissipative system in which the processes of the emergence of new structures and their ordering away from equilibrium occur. The functioning of the body occurs according to the statistical laws of physics and chemistry. Therefore, to master these laws, a graduate student at a medical university needs to study statistical physics and physical chemistry, which are based on set theory, mathematical probability theory and differential-integral calculus.

The mathematical methods that form the basis of information technology are widely used in medicine, if only to correctly read a regular cardiogram. Without knowledge of the basics of mathematics and computer science, it is impossible to master computer technology, use the capabilities of computed tomography, because modern medicine cannot do without the most complicated equipment and innovative modern technologies.

In modern surgery, various manipulators and robots are increasingly used, and their design and construction are based on mathematical models and calculations considered in the theory of mechanisms and machines, traditional mathematized technical discipline.

The use of manipulators and robots in surgery makes it possible to carry out such operations that without this technique it would simply be impossible to perform with high reliability for the treatment of seriously ill patients, for example, in oncology, cardiology, etc.

In recent years, there has been an active introduction into medicine of mathematical modeling methods and the creation of automated including computer systems. This significantly expanded the possibilities of diagnosing diseases in the early stages, developing individual therapy programs and successful rehabilitation of patients.

In conclusion, it should be noted that the application and development of mathematical models and methods contributes to: expanding the field of study of the human body as an object of knowledge in medicine; the emergence of new highly effective diagnostic and treatment methods that underlie the development of life support systems; the creation of medical equipment.

A medical practitioner just now cannot do without knowledge of mathematics, which he voluntarily or involuntarily applies and will apply in an ever-increasing volume in the calculations of statistical models and information technologies. They contribute to increasing the efficiency of existing and the search for new methods of diagnosis and treatment of various diseases, maintaining the health and longevity of a person, contributing to his creative development andthus social progress.

References:

1. Balakin Yu.A. Theoretical foundations of external influences on the process of crystallization of metals. - M .: Publishing house "Buki Vedi", 2014. - 168 p.

2. Balakin Yu.A., Yunusov Kh.B., Budnik A.A., Sokolov I.V., Khaulin A.N. The influence of external influences on interfacial interaction during crystallization of metals // Bulletin of Moscow State Regional University. Series: Natural Sciences. 2016, No. 2, pp. 78-86.

3. Balakin Yu.A., Zavalishin I.V., Budnik A.A. Development of the theoretical foundations of innovative technology for refining metal melts // Quality. Innovation Education. 2015.No 6 (121). S. 30-36.

4. Volkenstein M.V. Entropy and information. - M .: Science. Ch. ed.phys. lit.1986. - 192 p.

5. Prigogine I. Introduction to the thermodynamics of irreversible processes / Per. from English V.V. Mikhailov - Publishing House: Foreign Literature, M., 1960. 127 p.

6. Prigogine I., Condepudi D. Modern thermodynamics. From heat engines to dissipative structures / Per. from English Yu.A. Danilova and V.V. Bely - Moscow: Mir, 2002 .-- 461 p.