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MATHEMATICS IN MEDICINE.

Abstract: Clinical research is a type of scientific activity, without which it is impossible to obtain and select new, more effective and safe drugs. Mathematics and medicine are closely related to each other, and without mathematics it is impossible to imagine modern medicine. Mathematics is applied in many areas of life in the analysis of various situations. At first glance, mathematics in medicine may seem incompatible with the theme of human activity. Mathematics is generally recognized as the foundation of all sciences. Solves problems of chemistry, physics, astronomy, economics and other sciences.

Keywords: education, mathematics, medical, clinical, happening, technology, instrumentation, plan, subject, rapidly, discipline, healthcare, theoretical, accounted for, set based.

In the training programs for students of medical specialties, mathematics is a subject that is not a profile discipline. However, its study is extremely important for future doctors, since recently there has been a rapid mathematization of the healthcare field.

In medical educational institutions, the role of mathematics is inconspicuous, since in all cases, medical and clinical disciplines naturally come to the fore, and theoretical, including mathematics, are pushed into the background as a subject of basic higher education. At the same time, it is not taken into account that the mathematization of healthcare in the global space is

happening rapidly, new technologies and methods based on mathematical achievements in the field of medicine are being introduced.

Results. To do this, students must learn the basic property of mathematical terms:

- Proportion in mathematics and in medicine. A proportion is the equality of the ratios of two or more pairs of numbers or quantities. In the right proportion, the product of the extreme terms is equal to the product of the averages.

$$a : b = c : d \quad a \cdot d = b \cdot c$$

Let's consider examples where pharmacists, using theoretical knowledge, make up solutions of medicinal substances in such proportions as to help the human body, and at the same time, not to harm. In the right doses, the medicine gives a therapeutic effect, in smaller doses it is useless, and in large doses it is harmful. Proportions are observed in the manufacture of medicines. Accuracy is necessary here, since if the proportions of the ingredients that make up the medicine are violated, it may turn out not a medicine, but a poison. Mathematics plays one of the main roles in the creation and application of medicines. The therapeutic effect of the drug depends not only on the type of components, but also on the proportions in which they are included in it. A pharmacist should be able to solve problems on the proportion and concentration of solutions. On the packaging of the medicine, we can read the composition and quantitative indicators of ingredients, active substances, instructions on the norm and time of taking the medicine – and this is also mathematics.

- Statistics in mathematics and medicine. Mathematical statistics is a science that develops mathematical methods of systematization and use of statistical data for scientific and practical conclusions. Since medical statistics is a method of social diagnostics, since it allows us to assess the state of health of

the population of the country, region and on this basis to develop measures aimed at improving public health. The most important principle of statistics is its application to study not individual, single, but mass phenomena, in order to identify their general patterns.

- Graphs in mathematics and medicine. A graph of a function is a geometric concept in mathematics that gives an idea of the geometric image of a function. The graph of a function is the set of points in the plane, the abscissae of which are the value of the argument x, and the ordinates are the corresponding value of the function y=f(x). Since a medical cardiogram is a record of the contraction of a person's heart, which is carried out using some kind of instrumental method. The essence of electrographic is to register potential differences in time. The graph is a curve that shows us these changes and is a cardiogram. A cardiogram of the heart shows the excitement of the heart and its contraction. Mathematics is widely used in cardiology. Modern devices allow doctors to "see" a person from the inside, correctly diagnose and prescribe effective treatment. Engineers using the apparatus of physical and mathematical research are engaged in the creation of such devices. The rhythms of the heart and the movement of the mathematical pendulum, the growth of bacteria and geometric progression, the DNA formula are all examples of the application of mathematical calculations in medicine. To solve the problem of heredity, you need to use knowledge from the field of combinatorics, thanks to which you can calculate various variants of the distribution of chromosomes, the number of such variants and other necessary information. If, for example, it is necessary to make a program that, based on the symptoms of the disease, will semi-automatically help you choose the appropriate method of treatment, then this is the most direct application of mathematics in medicine. Because for this purpose, a mathematical model is first built, i.e., a "human model" described in the language of mathematics.

Discussion of the results. Let's look at examples where mathematics is used in medicine. Appointment and calculation of medicines. Calculation of indicators of morbidity, fertility and life expectancy. Diagnosis of various morbidity. Effectively obrobot all data about the patient and his growth analysis results. Correctly read the usual cardiogram. Calculation of pulse pressure. Correct selection of glasses and so on. We meet with mathematics every day without even realizing it, percentage problems, proportion problems, theoretical calculation. For the correct calculation of the number of tablets and capsules. To calculate the dose of medicines.

Let's get acquainted with how to compose and solve differential equations of the theory of epidemics during the long course of the disease under study. In this case, the transmission process is much faster than the continuation of the disease, and infected people will continue to infect other people if they stay in the group. At the initial moment of time t=0, let a be the source of the disease, b be a non-infectious source.

Let x(t), y(t) be the number of sources that infected and did not infect the disease. The following equation is valid at moment t from any time interval less than the lifetime of one generation.

$x+y=a+b$

In this condition, it is necessary to determine the law of change in the number of uninfected sources over time, that is, the function $y= f(t)$.

Since infection is transmitted through contact between infected and uninfected sources, the number of uninfected sources decreases over time in proportion to the number of contacts between infected and uninfected sources.

For the time interval dt, dy= - kxydt is output, where k is the proportionality coefficient. If we sum the value of x =a+b-y to this equation, we get the following differential equation.

dy/dt=-ky(a+b-y)

We find a solution to the differential equation using the fact that y =b at initial t =0.

y(t)=(a(a+b))/(b+ae^k(a+b)t)

The found formula represents the law of reduction of uninfected sources over time.

References:

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