

**Vladimir Aleksandrovsky:
What will happen to medicine after the pandemic?
The main trends that will change our lives**

COVID-19 has had the greatest impact on medicine. Vladimir Aleksandrovsky, founder of the Diagnocat service, which uses artificial intelligence for dental diagnostics, and a chain of pediatric and adult dental clinics, talks about positive trends in the telemedicine market and how artificial intelligence will develop in medicine in the near future.

The pandemic has dramatically changed the medical market. The colossal load on the existing healthcare system around the world has shown that we are not ready for global catastrophes: there was a collapse in some countries. With the closure of borders, medical tourism was completely paralyzed. During the first wave in Russia, many clinics providing routine care were forced to close or were repurposed to fight COVID-19. The demand for and attendance of private clinics dropped significantly: all efforts were thrown into fighting the virus. Dentistry showed the greatest decline: the number of visits decreased by 40%.

But I cannot help but note positive trends: forced self-isolation spurred the development of the telemedicine market. People in general began to pay more attention to health; very accurate diagnostics and examination became important to them. The COVID-19 pandemic has increased interest in medical technology and led to an increase in investments in healthcare. I am sure this trend will continue in the future.

The main trend is the use of global technologies. We are already seeing a huge number of innovations in medicine. Leaders in this area are engagement platforms that get people involved in the process. From a rather tedious activity, treatment turns into a journey that begins with an app on your smartphone.

Artificial intelligence has begun to play a leading role in medicine. Now, during the pandemic, it is used to diagnose and monitor sick people, help people at home, and research vaccines. The market for medical solutions based on artificial intelligence is growing rapidly. According to Global Market Insights forecasts, its volume will reach \$13 billion by 2025. It is already clear that neural networks can solve critical medical problems.

Doctors make 30-40% fewer mistakes if they use artificial intelligence

Diagnostics is an area where AI has been used successfully for a long time. Babylon Health is currently the market leader. It is the largest platform that uses neural networks and Big Data for diagnostics. The patient enters symptoms in a mobile application, and the AI suggests a diagnosis and connects the patient with the necessary doctor.

Another powerful service, VIZ.ai, uses artificial intelligence computer vision to recognize cancer based on CT scans or MRI scans. AI is also widely used for the analysis of case histories, the development of new drugs, and in the work of surgical robots.

Neural networks take over routine tasks from doctors and free up time for complex, atypical cases. Artificial intelligence reduces the number of medical errors: when using AI in the analysis of X-ray investigations, doctors make 30-40% fewer mistakes, because neural networks exclude the human factor. A doctor may be tired or insufficiently attentive, but artificial intelligence can't.

As a rule, doctors tend to focus on the problems of which the patient is complaining, and thus they often overlook other diseases. For example, a patient comes to the dentist with the complaint: "This tooth hurts." The doctor will take an X-ray and look only at that tooth, and may overlook other problems. What does artificial intelligence do? It carefully analyzes the entire image, each tooth. If you go to a dental practice where AI is used, you can be sure that you will be given an accurate diagnosis, that they will not miss anything and that they will not overcharge you.

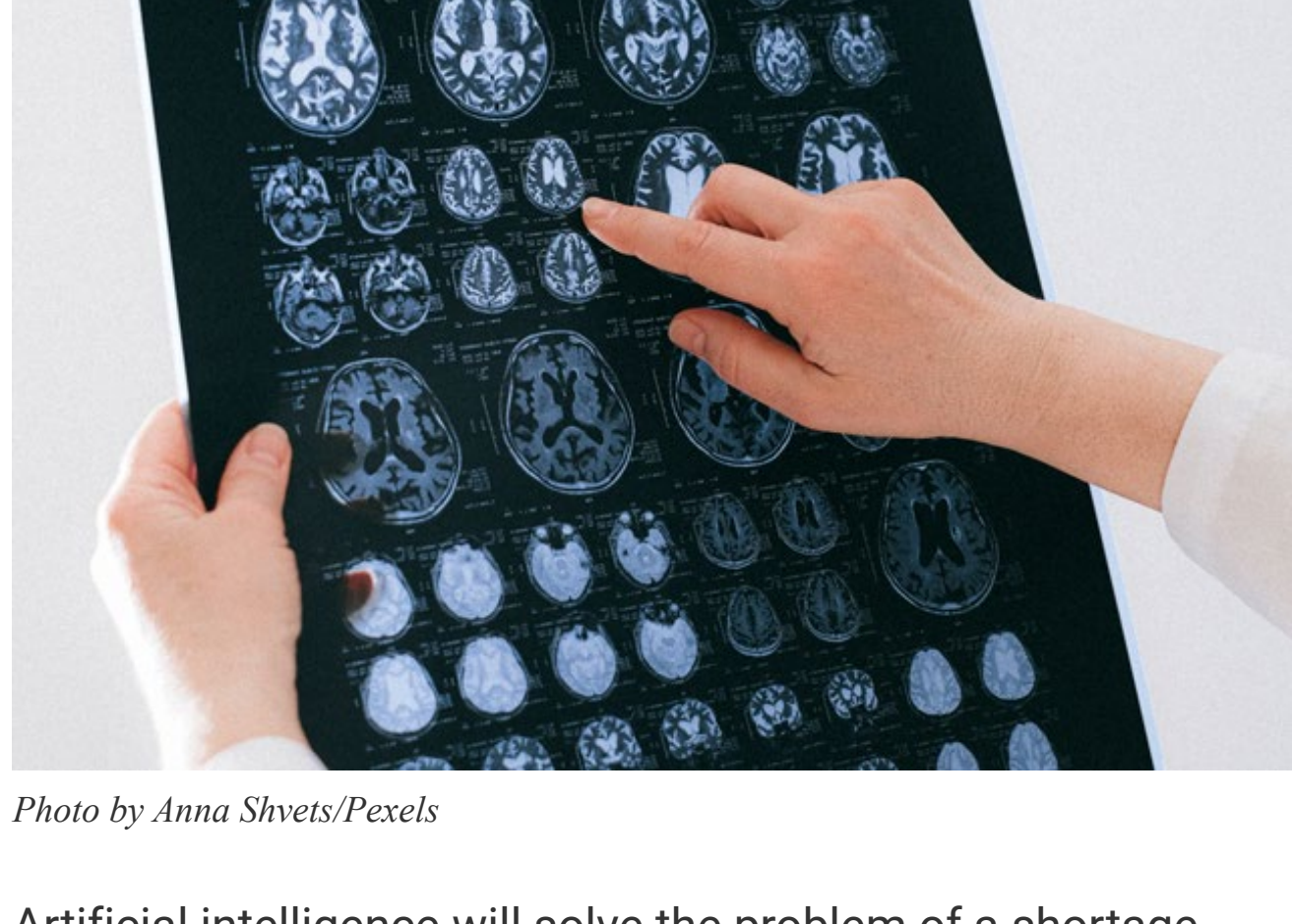


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Artificial intelligence will solve the problem of a shortage of doctors

Presently there is a global trend towards the creation of X-ray diagnostic centers, where dozens, even hundreds of radiologists work. This is a very good decision, especially for remote regions. There, expensive equipment (CT or MRI) has been purchased for clinics: the doctor can do the imaging, but difficulties arise with the diagnosis, since there is an acute shortage of qualified radiologists to interpret investigations.

Diagnostic centers can serve all clinics in the regions remotely using artificial intelligence. The neural network routinely analyzes the entire stream of results, noting pathologies. For example, a radiologist needs to interpret 50 investigations, and artificial intelligence prioritizes those where some problems are visible. Naturally, this enables faster diagnoses.

Another example is from dentistry. There is a shortage of pediatric dentists all over the world. Children often have to be treated by adult dentists or general dentists. However, many of them do not know the specifics of the treatment of milk teeth. But AI is able not only to make an accurate diagnosis using an X-ray image, but also to draw up a competent treatment plan.

Now one can objectively assess the quality of a doctor's work

Clinic statistics currently depend on data entered manually by doctors. The doctor may fill in the medical history inaccurately or with a delay; this is a global problem. Incorrect data generates false statistics, and it is impossible to make the right management decisions on its basis. Artificial intelligence completely solves this problem: it analyzes the data of all patients, forms an objective picture of their health, and can track the results of treatment.

This is even easier in dentistry. In most cases, the doctor refers the patient for an X-ray to make a diagnosis and outline a treatment plan. If 100% of this data is processed by AI, there will be an accurate picture of what exactly patients are presenting with most often.

After root canal treatment and crown placement, the doctor takes an X-ray again. Artificial intelligence is currently able to determine whether the job was done well or not. If a patient is observed for a long time, one can take follow-up X-rays at six months, a year and three years, and see that the doctor's work is of high quality, that he has good long-term results, that the crowns don't fall out. Such a system has already been implemented in many clinics based on the Diagnocat service.



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Medicine is becoming democratic

Artificial intelligence is, on one hand, a doctor's assistant, and on the other, an independent expert for the patient. AI essentially deprives the doctor of the monopoly on decision-making, because it gives the patient an understanding of how he is being treated and what is happening to him. The patient does not have enough specialized knowledge to decide for himself whether to take certain pills or whether to fill that tooth. A person must take the doctor's recommendations on faith. But AI gives a second objective opinion and thereby solves the problem of mistrust—medicine becomes truly democratic.

Medicine is becoming democratic

Here we must take into account that our medicine is very conservative, and the introduction of technologies goes slowly. There are doctors who resist, saying: "We don't need this; we already know everything". But research shows that artificial intelligence enables doctors to provide better care to patients, and also protects the interests of patients. I think that with the development of technology, doctors will use AI more and more; progress cannot be stopped.

Currently, the main objective of companies that develop solutions based on artificial intelligence is not only to create an ingenious algorithm, but also to integrate into the business processes of the clinic, not to break them, and also to offer doctors a tool that solves their daily problems and saves doctors' time.

Artificial intelligence and Russian legislation

Unfortunately, there are few AI startups in Russia. We have brilliant engineers and entrepreneurs, unique medical data and other resources, but there is no startup finance ecosystem at all. Successful Western experience shows that the best tool for developing AI is venture financing and market competition. Unfortunately, I can count on my fingers the Russian funds that invest in such companies. And there should be hundreds of them, because venture capitalists create the main thing—competition.

Another difficulty of ours is legal regulation. You need to obtain a marketing authorization from the Ministry of Health and Roszdravnadzor to sell drugs or any medical software product. You need to pass safety testing and obtain approval. This procedure currently takes up to three years. Obviously, medical software will be completely outdated by this time. This is a key stop factor in the development of artificial intelligence in Russian medicine.

For the same reason, we cannot introduce ready-made Western products. For example, there is excellent imported software that helps identify a stroke in a patient at an early stage, but we may not use it, because the program is not authorized in the Russian Federation.

Medical data and software will be moving to the cloud system very soon. Data will accumulate, and computers will become so powerful that they can process this data. Artificial intelligence will continue to develop and improve, and technological solutions will be built into the workflow of clinics, improving it. These changes will definitely benefit both doctors and patients.