

**THE ROLE OF MODERN COMPUTER TECHNOLOGIES AND ARTIFICIAL
INTELLIGENCE IN THE TREATMENT OF RESPIRATORY DISEASES IN
CHILDREN**

Atahanov Sanjarbek Anvarrovich

Assistant of the Department of “Biomedical Engineering, Biophysics and
Information Technologies”

Sherkoziyev Nursaidkhon Nodirbek oglu

Student of the Fergana Medical Public Health Institute

Annotation

This work extensively covers the role of modern computer technologies and artificial intelligence in the treatment of respiratory diseases in children. The study analyzes the relevance of respiratory diseases, the importance of digital diagnostic systems, telemedicine and artificial intelligence-based analysis methods in their early detection and effective treatment. In addition, the possibilities of increasing the accuracy of diagnosis with the help of artificial intelligence, individualizing the treatment process and predicting disease complications were considered. The results of the work show that modern technologies in pediatrics It shows that it is an important tool in increasing treatment efficiency, saving time and resources, and protecting children's health.

INTRODUCTION

Today, protecting children's health is one of the most important and priority areas of medicine. In particular, respiratory diseases in children - bronchitis, pneumonia, bronchial asthma, laryngitis and other respiratory diseases - are characterized by a high incidence and risk of complications. These diseases can negatively affect the physical development of children, the formation of their immune system and the quality of life. In recent years, the rapid development of digitalization processes in medicine has created the basis for the widespread introduction of modern computer technologies and artificial intelligence capabilities into practice. The use of artificial intelligence-based systems in the process of diagnostics, treatment and prognosis of diseases facilitates the work of doctors, increases the accuracy and speed of medical decision-making. This technology is especially important for early detection of respiratory diseases in children and choosing an individual treatment strategy. With the help of computer technologies, it has become possible to deeply analyze the results of X-rays, computed tomography, spirometry and other diagnostic methods. Artificial intelligence algorithms serve to determine the stages of disease development, assess the risk of complications and predict the effectiveness of treatment in advance by processing large amounts of medical data. In addition, the possibility of continuous monitoring of children's health using telemedicine and remote monitoring systems is expanding. In this regard, the role of modern computer technologies and artificial intelligence in the treatment of respiratory diseases in children, their practical significance and prospects require in-depth scientific study. This article analyzes these issues and highlights the role of modern technologies in pediatric pulmonology.

1. Detection of respiratory diseases using modern diagnostic methods.

1.1 The importance of computer technologies and artificial intelligence in diagnosis and early detection.

Today, one of the most pressing issues in the field of healthcare is the early detection of diseases and improving the quality of treatment. Within the framework of the goals and strategies set by our President, the use of modern computer technologies and artificial intelligence in medicine is of particular importance.

The introduction of computer technologies and artificial intelligence allows for the radical development of medical diagnostics. Modern systems quickly and accurately process patient histories, study imaging data such as X-rays, ultrasound, and computed tomography. As a result, our doctors can quickly and reliably detect diseases using advanced technologies.

Artificial intelligence is an effective tool not only for diagnosing, but also for preventing diseases and predicting the likelihood of their development. SI systems analyze personal data, genetic characteristics, and laboratory results and develop an individual treatment strategy for each patient. This expands the possibilities of a healthy lifestyle and continuous medical care.

1.2 Personalized medicine.

In modern medicine, the health of each child deserves special attention. Each child is an individual with unique genetic, immunological and clinical characteristics. Therefore, medications, their dosages and treatment plan should be prepared individually for each child.

Today, artificial intelligence (AI) systems help doctors perform this task.

For example:

- Analyzes the patient's genetic data, medical history, laboratory results and general health status;
- Determines the optimal drugs and their dosage;
- Develops an individual treatment plan and duration of therapy for each child.

As a result:

- Increases the effectiveness of treatment;
- Reduces complications and side effects;
- Facilitates the work of doctors and speeds up the decision-making process.

1.3 The role of artificial intelligence in disease prognosis.

Predicting asthma attacks and acute respiratory diseases (ARI) based on patient data using AI. Using AI, it is possible to predict asthma attacks and acute respiratory diseases (ARI) based on patient data (history, symptoms, medical test results). Artificial intelligence (AI) models analyze the patient's chronic diseases, living conditions, environmental factors (weather, air pollution) and predict the likelihood of an attack or exacerbation, which helps the doctor and the patient take preventive measures in advance.

2. The importance of innovative technologies in the treatment of respiratory diseases.

2.1 The importance of telemedicine and remote monitoring.

Telemedicine and remote monitoring provide convenience to patients, reduce medical costs, provide assistance to remote areas, facilitate the exchange of experience between doctors,

eliminate psychological discomfort and modernize the healthcare system through effective control of chronic diseases, and also help save patients' lives in areas such as cardiology. Patients can be examined by a doctor without leaving their home. This is especially important for patients who have difficulty breathing or limited mobility. Patients with chronic diseases will be in constant contact with their doctor and will have the opportunity to adjust their medication dosage in real time. During the outbreak of infectious respiratory diseases (for example, influenza or COVID-19), it will reduce hospital queues and reduce the risk of infection.

2.2 The importance of robotic surgery in medicine.

The use of robots in lung surgery increases the accuracy of surgical procedures, increases surgical precision, reduces blood loss, and speeds up the patient's recovery process, as robotic instruments have greater range of motion than human hands, which helps to perform complex operations with high precision without damaging healthy tissues, and creates conditions for faster patient recovery. Robotic surgical instruments have greater range of motion and rotation than human hands, which helps the surgeon make small and precise movements. Bleeding is reduced due to the possibility of operating through small incisions and minimal damage to healthy tissues. Minimal invasiveness and precision accelerate the patient's recovery after surgery.

2.3 The importance of artificial intelligence and X-ray analysis.

Artificial intelligence (AI) and X-ray analysis are revolutionizing the diagnosis and treatment of respiratory diseases in children. Since children's lungs are different from adults and are sensitive to X-rays, AI plays an important role in this process. AI algorithms can detect small changes that the human eye cannot see, helping to identify diseases such as pneumonia, bronchitis or tuberculosis at an early stage. In emergency situations, AI is important for analyzing X-ray images in a matter of seconds. Modern AI systems allow for accurate imaging and analysis even with minimal X-ray radiation, which is very safe for children's health. Main areas of application: Pneumonia detection, Foreign body detection, Participates in the control of chronic diseases. Automatically identifies foci of inflammation in lung tissue. Children often swallow small objects. AI helps to determine the exact location of a foreign body stuck in the respiratory tract. Dynamically monitors the condition of the lungs in chronic diseases such as cystic fibrosis or asthma.

2.4 The importance of 3-D printing technology.

3D printing technology is set to revolutionize the treatment of respiratory diseases in children by 2025. This technology allows for diagnosis and treatment tailored to each child's unique anatomy. Individual stents and splints: As of 2025, 3D-printed "bioresorbable" devices are being used for rare and life-threatening conditions such as tracheobronchomalacia (a condition in which the airways become soft and blocked). These devices expand as the child grows and dissolve on their own after a few years. 3D technology is being used to create special CPAP masks that are adapted to the child's facial structure, which reduces discomfort during treatment. Researchers are creating functional models of lung tissue and airways through 3D printing. These models are

used to study the molecular mechanisms of asthma and other respiratory diseases and to test new drugs. The practice of producing specially dosed and palatable (chewable) medicines for children on 3D printers is expanding. This is especially effective for children who cannot swallow traditional pills.

Future prospects

In the treatment of respiratory diseases in children, computer technologies (telemedicine, virtual rehabilitation, monitoring) and artificial intelligence (diagnostics, prognosis, personalized treatment) have great prospects, they help to detect the disease early, increase the effectiveness of treatment, improve the quality of life of patients, especially in chronic diseases such as asthma, COPD, provide innovative approaches.

Prospects for treatment and prognosis

AI algorithms analyze each patient's genetic data, medical history and response to treatment, helping to create individualized treatment plans tailored to him. This increases the effectiveness of treatment and reduces side effects. The settings of artificial respiration devices must be constantly changed depending on the patient's condition. AI systems can analyze respiratory parameters and blood gas levels and provide recommendations for optimizing ventilator parameters in real time. AI can help identify different phenotypes (characteristics) of asthma or chronic lung diseases, which will pave the way for the development of more targeted and effective treatments.

Future directions and challenges

In order for AI models to be reliable and generalizable, it is important to create large-scale high-quality databases through multi-institutional studies. Compliance with ethical standards and protecting data confidentiality when collecting data from children and their parents are among the pressing issues. The successful integration of AI into clinical practice depends on the understanding and acceptance of these technologies by healthcare professionals. In the future, AI and computer technologies will play an important role in the treatment of respiratory diseases in children. However, for their effective and safe use, special attention must be paid to data security, personnel training, legal and regulatory frameworks, and ethical issues.

Conclusion

In the treatment of respiratory diseases in children, modern computer technologies and artificial intelligence (AI) are of great help in determining the diagnosis, creating a treatment plan, monitoring the patient's condition in real time, remote monitoring, as well as developing new drugs; these technologies can help in early detection of diseases, personalized treatment and, in general, increase the effectiveness of treatment. AI algorithms demonstrate high accuracy in analyzing X-ray and CT (computed tomography) images, helping to quickly and early detect pneumonia and other respiratory diseases. Technologies such as digital stethoscopes provide objective analysis of lung sounds, providing more reliable information than human hearing. AI helps to create personalized treatment plans by analyzing the patient's specific data, symptoms

and response to treatment. This optimizes treatment outcomes. Smart sensors and wearable devices continuously monitor children's vital signs (heart rate, respiratory rate, body temperature). Prevents complications by notifying doctors or parents of abnormal changes in real time. In conclusion, modern computer technologies and artificial intelligence offer promising solutions in pediatric pulmonology that allow to accelerate diagnostic processes, make treatment more effective and targeted, and keep patient care under constant control. However, the widespread implementation of these technologies requires data confidentiality, compliance with ethical standards, and close cooperation between medical professionals and technology developers.

Issue Relevance

Today, protecting children's health is one of the priorities of state policy. In particular, the increasing incidence of respiratory diseases in children, which pose a serious threat to their health from an early age, requires modern approaches. From this point of view, the widespread introduction of modern computer technologies and artificial intelligence into the healthcare system is emerging as an urgent political task. It is necessary to develop a digital medical infrastructure at the state level to ensure early detection and effective treatment of respiratory diseases in children. The introduction of diagnostic systems based on artificial intelligence will facilitate the work of doctors, reduce errors associated with the human factor, and improve the quality of treatment. This is an important strategic step towards creating a healthy generation.

References :

1. Atahanov, S., & Rasulova, F. (2025). NEVROLOGIK VA RUHIY KASALLIKLARNI DAVOLASHDA ZAMONAVIY KOMPYUTER TEXNOLOGIYALARNING O'RNI VA ISTIQBOLLI USULLARI. Наука и технология в современном мире, 4(7), 87-91.
2. Atakhanov, S., Khasanov, I., & Ergashboev, O. (2025). THE ROLE OF MODERN COMPUTERS IN THE DIAGNOSIS AND TREATMENT OF HYPOTHYROIDISM. Инновационные исследования в современном мире: теория и практика, 4(10), 154-156.
3. Атаханов, С., & Эргашев, Ф. (2025). РОЛЬ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В ДИАГНОСТИКЕ И ЛЕЧЕНИИ СЕРДЕЧНЫХ ЗАБОЛЕВАНИЙ. Modern Science and Research, 4(4), 642-651.
4. Atakhanov, S. A., & qizi Yoqubjonova, U. N. (2025). THE ROLE AND SIGNIFICANCE OF MODERN COMPUTER TECHNOLOGIES IN THE DIAGNOSIS AND TREATMENT OF HEART DISEASES IN ADOLESCENTS AND YOUNG CHILDREN. EduVision: Journal of Innovations in Pedagogy and Educational Advancements, 1(4), 483-488.
5. Атаханов, С., & Касымова, М. (2025). ДИАГНОСТИКА, ПРОГНОЗИРОВАНИЕ И ЛЕЧЕНИЕ АНЕМИИ С ИСПОЛЬЗОВАНИЕМ НОВЕЙШИХ КОМПЮТЕРНЫХ ТЕХНОЛОГИЙ. Педагогика и психология в современном мире: теоретические и практические исследования, 4(8), 18-22.