

# THE HISTORICAL AND SCIENTIFIC PATH OF UZBEK MEDICINE: FROM IBN SINA'S TREATISES TO DIGITAL HEALTHCARE

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## Abstract

This article explores the historical development of medicine in Uzbekistan, emphasizing the enduring influence of Ibn Sina (Avicenna) on modern medical practices. Avicenna's seminal work, The Canon of Medicine, shaped medical theory for over six centuries and remains integral to contemporary healthcare. The article traces the evolution of medical thought from Avicenna's holistic approach to the current advancements in Uzbekistan's healthcare system, demonstrating the continuity of scientific progress. It highlights the intersections between medieval and modern clinical practices, including individualized treatment, evidence-based medicine, psychosomatics, pharmacology, and empirical methodologies. By examining the philosophical, clinical, and ethical parallels between Avicenna's contributions and 21st-century medical standards, the article illustrates the profound legacy of Avicenna's work in shaping both Eastern and Western medical traditions. Furthermore, it outlines Uzbekistan's historical contributions to medicine and the challenges faced in the 20th and 21st centuries, culminating in the country's healthcare reforms and advancements. The study underscores the relevance of Avicenna's ideas in the context of contemporary medicine, emphasizing their role in the ongoing development of Uzbekistan's healthcare system.

**Keywords:** History, Ibn Sina (Avicenna), The Canon of Medicine, Medical history, Uzbekistan, Medical ethics, Modern medicine, Interdisciplinary approach, Global scientific progress.

## INTRODUCTION

The philosophy of treatment, whether in the medieval period or the modern era, has common roots that go deep into history, where the works of Ibn Sina (Avicenna) played a crucial role. His work The Canon of Medicine not only had a profound influence on the formation of medical theory but also served as the primary textbook in universities across Europe and the Islamic world for over six centuries. Even in the 16th century, The Canon remained an essential element of medical education in Italy, France, and Spain. This proves that Eastern scientific thought, particularly from Uzbekistan, was an integral part of global scientific progress.

Today, in the 21st century, as medicine rapidly advances, revisiting the legacy of Ibn Sina becomes especially relevant. His ideas on the unity of the body and soul, the importance of clinical observation, and the ethical duties of physicians remain the foundation of humane medicine. Uzbekistan, as the birthplace of Avicenna, is a unique example of a country where the history of medicine is deeply intertwined with its future.





The aim of this article is to establish a deep connection between the medical views of the Avicennian era and modern clinical approaches, as well as to trace the development of medicine in Uzbekistan from the Middle Ages to the present. Additionally, an important task is to identify the philosophical, clinical, and ethical parallels between the works of Ibn Sina and current medical standards of the 21st century.

The research methodology includes a historical-analytical approach, which involves comparing the philosophical and medical views of Avicenna with contemporary scientific data. An interdisciplinary approach is also used, incorporating information from the fields of medical history, philosophy, clinical psychiatry, cardiology, pharmacology, neurology, and nephrology. The main sources include publications in scientific databases such as PubMed, Scopus, Athens Journals, and Google Scholar, as well as primary sources, including The Canon of Medicine. A comparative analysis of descriptions of pathologies, diagnostic methods, treatments, and ethical-philosophical aspects of medical practice has been conducted. The comparative analysis shows that many of Ibn Sina's ideas remain relevant today.

**Individualized Approach:** Avicenna emphasized that the same medicine works differently on different people—this thought became the foundation of modern personalized medicine. **Symptom-based Diagnosis and Logic:** Ibn Sina advocated for observation and analysis, which in the 21st century has developed within the framework of evidence-based medicine. **Psychosomatics and Psychiatry:** His descriptions of mental disorders and methods of influencing patients' thinking are an early precursor to cognitive therapy. **Pharmacology:** Out of the 2,500 medicines described in The Canon, about 500 are still used today. This is approximately 20% overlap, which is impressive even by modern scientific standards. **Empirical Methodology:** During his experiments with animals, he studied behavior under impaired nerve conduction, thus laying the foundation of neurophysiology.

Ibn Sina (Avicenna, 980–1037) was born near Bukhara, in present-day Uzbekistan. By the age of 16, he had mastered medicine and began treating patients, and by 21, he had written his first treatises. His famous Canon of Medicine became an encyclopedia of medicine, describing over 760 medicinal plants, more than 2,500 medical terms, and dozens of diagnostic and treatment methods.

Avicenna's philosophy is based on a holistic approach to the patient: he viewed the body, mind, and soul as a unified whole. This approach became the foundation not only for medicine but also for psychiatry. He was the first to propose methods similar to cognitive-behavioral therapy, using empathy, verbal techniques, and logical analysis of patients' misconceptions. This method was ahead of its time by more than 900 years.

Additionally, Ibn Sina described the relationship between arterial pressure, the kidneys, and the heart, which in modern medicine is explained through the renin-angiotensin-aldosterone system (RAAS). The symptoms he described align with today's understanding of hypertension and kidney failure. This proves that Avicenna essentially anticipated an entire field of clinical nephrology.

After Ibn Sina's death, his works spread widely across both the East and West. In Samarkand, Bukhara, Urgench, and Khiva, madrassas were established where medicine, philosophy, and the natural sciences were taught. Medical practice of that time was based on the works of Avicenna,





Galen, and Hippocrates, but Eastern scholars made significant adjustments based on empirical observation.

In Central Asia, during the 15th century, vaccination, hygiene, and hospital organization flourished. During the reign of Ulugh Beg in Samarkand, an observatory and scientific school were built, where medical knowledge was combined with astronomy, mathematics, and philosophy.

In the second half of the 19th century, after Central Asia became part of the Russian Empire, the process of Europeanization of medicine began. Hospitals, pharmacies, and schools for feldshers were opened in Tashkent and Bukhara. However, the rapid development of the healthcare system began only in the Soviet period.

After the October Revolution of 1917, the new government established the People's Commissariat of Health, which became a crucial step in forming the foundation of the modern healthcare system. However, due to a severe shortage of medical personnel, the position of commissar remained vacant for a long time. In the first three years, five individuals held the position of People's Commissar of Health. The government had to appoint former military doctors, many of whom were distrustful of the new authorities. As a result, the residents of the Turkestan Autonomous Region were virtually left without medical care.

The situation changed with the appointment of Sa'dulla Tursunkhodjaev. The structure of the People's Commissariat of Health began to expand: regional boards were formed, and medical associations were created in major cities. By order from Moscow, all doctors, feldshers, and veterinarians were required to register with the commissariat, creating a permanent medical staff distributed across all regions. At the local level, health sections were established under regional and urban Soviet councils, which later transformed into health departments of local councils.

On December 31, 1918, a decree was issued on the "Free Treatment of the Proletariat". According to the decree, due to the special political situation, medical care should be free and accessible to all residents of the region, even for the mentally ill and prisoners.

After an outbreak of cholera and typhus, as well as a famine, the government was forced to take additional measures to protect citizens' health. The Soviet Labor and Defense Council allocated loans to Turkestan for anti-epidemic measures and sent more than 4,000 sets of clothing, medical gowns, and sanitary trains to the region. The government conducted an extensive information campaign to combat typhus.

In 1919, the first batches of vaccines against infectious diseases were delivered from Moscow to Tashkent. The Moscow Social Hygiene Museum sent brochures, films, and slides on tuberculosis prevention to Turkestan.

Soon, the first proletarian hospital opened in Samarkand, a physiotherapy hospital in Fergana, and a children's hospital in Kokand. Sanatoriums and rest homes began operating in the republic. The Medical Faculty of Turkestan State University opened, graduating only 27 students in 1922, but by 1923, it had 973 students, 425 of whom were women. Medical students were sent to fight epidemics and were treated as military personnel.

An epidemiological statistics center was created in the country, where daily reports on infections and the progress of disease control were sent. The RSFSR provided Turkestan with a loan of 18 billion rubles to fight epidemics and sent additional medical personnel. Turkestan established its own bacteriological laboratory, followed by the creation of a bacteriological institute. Around this





time, the first tuberculosis and dermatovenerological dispensaries opened, and studies on malaria, rishte, and pandinsky ulcers continued. Thirty years later, malaria had been completely eradicated in Uzbekistan.

In the 1930s, medicine made significant strides forward with the development of radiology and oncology. The government increased wages for medical staff and allocated more funds to medical institutions, bringing healthcare in Uzbekistan to a nationwide level. Many of the challenges faced by doctors were overcome, and by 1940, malaria incidence had decreased fivefold compared to 1932.

In 1941, the USSR entered World War II. By October 1, within just three months, 48 hospitals with nearly 15,000 beds had been built and equipped. Despite the evacuation of many people and entire enterprises to Uzbekistan, the healthcare system managed to maintain a healthy environment. The Uzbek Blood Transfusion Institute played a major role in assisting wounded soldiers and patients. In 1946, the first research institute for restorative surgery for disabled war veterans opened, and according to reports, 96% of patients recovered and were able to return to work.

In 1970, the "Healthcare Law" was passed in Uzbekistan. It was the first law to outline the rights and responsibilities of medical personnel. However, in the 1980s, the situation changed, and progress slowed down. The political environment in the country shifted, and the healthcare system declined.

The economic crisis had a significant impact on healthcare, with doctors going for months without pay, and medications in short supply. Despite this, new hospitals and clinics were still being opened, although they were poorly equipped, lacked communication systems, and lacked basic facilities, making the efforts of medical professionals largely ineffective.

With independence in 1991, Uzbekistan faced the need for healthcare reforms. The isolation of the country ended, and medical professionals began collaborating with their foreign counterparts, learning from their experience, and attempting to overcome the "Soviet" backwardness.

In 1998, the "State Program for Healthcare System Reform" was adopted, marking a gradual transition to a national healthcare model. The program identified five areas for improvement: improving sanitary conditions, developing an emergency medical system, providing better care for mothers and children, increasing funding, and reforming primary healthcare.

As a result, 2,500 rural medical posts were established, and the Republican Emergency Medical Center with 13 regional branches and over 130 ambulance stations opened across the country. From 1990 to 2002, infant mortality in Uzbekistan decreased nearly by half, to 17 per 1,000 live births.

In 1998, the first private clinic opened, benefiting both business and healthcare. The network of private clinics grew, providing conditions for quality medical care, while state clinics still struggled with funding. In 2005, the salary system for medical staff changed: the more a doctor worked, the more they earned.

In 2011, a project on maternal and child health was launched in collaboration with the German Bank, and in 2012, a project to modernize oncology facilities was launched in collaboration with the Islamic Development Bank.







At a meeting with healthcare representatives in January 2017, President Shavkat Mirziyoyev noted that more than 7,000 complaints to the President's Virtual Reception were related to healthcare. While the Center for Economic Research at UNDP Uzbekistan called the country's healthcare system excellent, it did highlight some issues, including inadequate financing and inefficient resource use.

Thus, over more than three decades, significant progress has been made. A multi-level healthcare system has been established, ranging from rural medical posts to national specialized centers. Modern clinics have been founded, such as the Academician Vakhidov Cardiovascular Surgery Center and the Scientific Research Institute of Virology. Healthcare digitization has begun with the introduction of electronic patient records, telemedicine, and mobile apps for diagnosis. Biotechnology, personalized medicine, and the use of AI in diagnostics and Big Data in epidemiological analysis are developing rapidly. Significant attention is also being paid to personnel training, with opportunities for internships abroad, a competency-based modular training system, and the development of scientific activities for students and residents.

The "Comprehensive Measures for the Radical Improvement of Healthcare in the Republic of Uzbekistan" decree of December 7, 2018, approved the Concept for the Development of the Healthcare System for 2019-2025. The concept outlines measures to improve the regulatory framework, implement public-private partnerships in the sector, introduce mandatory health insurance, and more. It also notes that "there are still some problems and negative phenomena in healthcare that hinder the effective resolution of tasks for further improvement."

In conclusion, the development of medicine in Uzbekistan is a vivid example of the continuity of scientific thought. From Ibn Sina's philosophical works to cutting-edge biomedical technologies, the thousand-year journey shows how historical heritage can become the foundation for modern scientific breakthroughs. The figure of Avicenna remains central in this process: his ideas on health, medical ethics, diagnosis, and treatment have not lost their significance and are experiencing a renaissance in the context of modern humane and high-tech medicine. Today, Uzbekistan not only honors its medical past but is also actively building a progressive future based on it.

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