

The History of Anesthesia and Anesthesiologists in Iran

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The evolution of anesthesia and anesthesiology represents a pivotal chapter in the history of medical science, significantly enhancing patient care and surgical outcomes. General anesthesia, defined as the deliberate induction of a temporary state of pain relief, muscle paralysis, memory impairment, and unconsciousness, has revolutionized medical procedures by inhibiting the normal functioning of the central nervous system. In Iran, the journey of anesthesiology began with early contributions from ancient scholars and practitioners, whose innovative techniques laid the groundwork for future advancements. The field witnessed significant progress in the mid-20th century, aligning with global developments in medical science. Initially focused on intraoperative care, anesthesiology in Iran expanded to encompass preoperative evaluations, postoperative assessments, and comprehensive patient monitoring, addressing complications related to surgery and anesthesia. In addition to analyzing the evolution of anesthesiology from solely surgical intervention to a broader field encompassing preoperative evaluation, postoperative care, and critical care management, this paper addresses the challenges and opportunities facing anesthesia and anesthesiology in Iran, including the need for wider access to safe and reliable services and the integration of advanced technologies.

Keywords: Anesthesia; Anesthesiology; Anesthesiologist; History of Medicine; Iran; Medical Education; Persia

INTRODUCTION

In medicine, anesthesia refers to a deliberately induced condition in which a patient, either consciously or unconsciously, loses control over a specific body part or the entire body and its immediate surroundings. This temporary state of anesthesia can result in pain relief, muscle paralysis, memory impairment, and unconsciousness (1). The primary aim of this process is to temporarily diminish or inhibit the normal functioning of the nervous system. Anesthesia can be administered through local, general, or sedative means in medical practice.

Among the numerous noteworthy advancements in the medical field, the conquest of pain stands out as a

milestone that has the potential to impact individuals worldwide. Approximately 7-8% of the global population undergoes anesthesia procedures for diagnostic examinations or surgical interventions each year (2). Since the 1940s, the specialized field of anesthesiology has made remarkable strides in medical science and healthcare. Over 50 years ago, anesthesia primarily served as an intervention solely during surgery to manage the patient's condition during the operation. However, the scope of anesthesia has gradually expanded to include preoperative evaluations, postoperative assessments, and careful monitoring, enabling the effective management of surgical and anesthesia-related complications.

In modern medical practice, an anesthesiologist's responsibilities go far beyond preoperative care. The field has expanded to encompass various subspecialties, including pain management, critical care, palliative care, and sleep medicine. This growth has increased their impact on patient outcomes, leading to shorter hospital stays, higher patient satisfaction, and better overall results. As a result, the work environment of an anesthesiologist has significantly changed and now covers not only operating rooms, which were once their main area, but also intensive care units (ICUs) and various clinics (3).

The involvement of an anesthesiologist in ICUs holds great significance as it helps mitigate the potential complications associated with mechanical ventilation, sepsis, and renal and cardiovascular failure, which are common risks following complex surgical procedures. These aspects are typically addressed within the framework of "Enhanced Recovery After Surgery" (ERAS) protocols (4). Furthermore, in addition to managing intricate physiological and anatomical conditions, such as airway control, the field of anesthesiology has progressed in tandem with advancements in pharmacology and technology, particularly in diagnostic and therapeutic devices. These advancements collectively contribute to minimizing treatment complications.

It is worth emphasizing that around five billion individuals worldwide lack access to safe and timely anesthesia and surgical services, which constitutes a significant and often overlooked issue in global health. This fundamental deficiency is four times more lethal than the three prevalent infectious diseases globally, namely, AIDS, malaria, and tuberculosis (5).

The significance of this discipline within medical sciences has gained recognition and increased awareness, particularly with the advent of the information age and the integration of evidence-based medical practices. Furthermore, the exploration of new domains, such as genetics and molecular medicine, has significantly contributed to the advancement of this field. Understanding the historical legacy and the contributions

of scientists and specialists from Ancient Persia to the present day helps provide a comprehensive perspective on the growth and development of anesthesiology. This knowledge can offer valuable insight into the evolution of this scientific field, especially for young physicians and anesthesiologists in the country, when viewed in the context of other medical disciplines.

In this research, alongside a comprehensive examination of published articles, abstracts, and books, valuable insights have been gathered through conducting oral interviews with distinguished seniors in the field of medical sciences. This study aims to provide a comprehensive overview of the history, challenges, and future perspectives of anesthesia and anesthesiology in Iran, shedding light on its evolution and impact on the healthcare system.

Anesthesiology in the Ancient Era

Today, the evidence from archaeological excavations suggests that ancient Persians performed skull and eye surgeries as early as 2800 BC (6). Historical documents show that Persian and Indian surgeons have even performed reconstructive surgeries (7). The documents from the Burnt City show that a 13-year-old girl suffering from hydrocephalus had successfully undergone skull surgery (8). It is natural that not using anesthetics and painkillers to control pain in these surgeries seems impossible. In this regard, the use of cannabis (*Cannabis sativa* L.) has been mentioned in historical sources (9).

According to the ancient legends of Ferdowsi's *Shahnameh*, in the story of Rostam's birth, a type of cesarean section called Rostamineh or Rostamzad was implemented. These verses by Ferdowsi in the *Shahnameh* are, in fact, a historical record of the first Caesarean section ever performed, predating the story of Julius Caesar's birth. This is an alternative method of normal vaginal delivery (NVD) nowadays known as cesarean section. Scrutinizing the historical documents shows a notable difference with the contemporary procedure: a vertical incision has been made in the mother's lateral side (instead

of a midline horizontal incision) in this operation. In this surgery, Simorgh used the combination of cannabis and camphor as a special drink to reduce pain. It demonstrates that, despite the legendary nature of the Shahnameh stories, ancient Persia had an understanding of the need for analgesia and anesthesia in surgical procedures (10,11).

The golden age of scientific progress occurred after the rise of Islam, from around the 7th to the 9th century AD, a period known as the Islamic Golden Age. The science of medicine made rapid and abundant progress during this period. Muhammad bin Zakariya Razi (Rhazes), born in 860 AD in Ray, contributed to many advances in medical science. Among his innovations, we can mention the invention of the anesthetic sponge. Although Ibn Sina (Avicenna) and Zahrawi (Abulcasis) also used this method, it is possible that Razi was the first physician to use inhalation anesthesia in surgeries. He dipped a sponge in a solution of opium, hemp seeds, marigold, and loiseuria, and used it as an inhalation for anesthesia (12).

From 949 to 982 AD, Haly Abbas researched narcotics in Shiraz and used them for anesthesia and pain control. He has used different words, such as *Mokhadder* (anesthetic or narcotic), *Monavvem* (sedative), *Mosabbet* (hypnotic), and *Mosakken* (painkiller), in the formulations of narcotic drugs (13).

Ibn Sina (980-1037 AD) devoted a separate section of The Canon of Medicine to this topic, titled "Pain and Numbness" (14). His classification in the field of pain is very similar to the McGill Pain Questionnaire, which was established in the 1970s. He mentioned surgical methods such as oropharyngeal intubation and tracheostomy in his book. In the field of drugs, he has also mentioned the analgesic effect of opioids on eye and dental problems (14-16). In this regard, it is very interesting that Avicenna was familiar with 15 different types of pain, including coarse, disintegrating, pricking, stretching, compressing, itching, breaking, soft, stabbing, penetrating, *Massli* (caused by entrapment of a substance inside an organ), heavy, numbing, pulsating, bitter, and tiredness (14).

Hakim Seyed Esmail Jorjani, a physician of the 11th and 12th centuries AD, also mentioned cases of local anesthesia with compounds such as poppy and marigold.

Anesthesiology in the Modern Era

The era of modern anesthesia in the world is about 170 years old. For the first time, successful anesthesia in surgery was performed in 1864 by a dentist, William Morton, at Massachusetts General Hospital. However, before this, surgery was possible with or without pain, and drugs such as opium or alcohol were used to relieve the pain (17,18). Since then, there have been advances in various elements of anesthesia, including gases, laryngoscopes, endotracheal tubes, intravenous drugs, anesthesia machines, ventilators, and masks.

The modern history of anesthesia in the West began to take shape with the establishment of the first anesthesiology association in America in 1905, known as the Long Island Society of Anesthetists. This organization later evolved into the American Society of Anesthesiologists (ASA) in 1945. The American Medical Association (AMA) recognized anesthesia as an independent medical specialty in 1940, marking a significant milestone in the professionalization and advancement of anesthesiology (19).

In Iran, the history of modern medicine, including the beginnings and development of anesthesia in surgery, is both interesting and significant. Dar al-Fonun was founded in 1851 by Mirza Taghi Khan Farahani (Amir Kabir) as the first modern educational center in Iran. This institute was the most important center of science and technology in Iran at the time, regarded as the oldest Western-style institute of higher education in the country. In 1852, Amir Kabir invited Jakob Eduard Polak, the Austrian physician, to Dar al-Fonun for the education of medical students. He performed the first surgery in 1852 using ether for anesthesia. Later in 1872, with the establishment of the Sina Hospital, which was a public hospital, surgery expanded further using more advanced anesthesia methods (11, 20, 21).

After returning from his second trip to Europe, Naser al-Din Shah, the fourth King of the Qajar dynasty, entrusted Ali Akbar Khan Nafisi (Nazem al-Atteba) with the construction of a hospital in Tehran. As a result, a

government hospital was opened in Hassan Abad Square, which is known today as Sina Hospital. This building was opened in 1852 (22). Medical students of Dar al-Fonun regularly studied at the bedside of patients in this hospital.

In November 1918, the School of Medicine, led by Dr. Mohammad Hossein Loghman Adham (Loghman al-Doleh), was separated from Dar al-Fonun. This school continued its operations in a separate area of Dar al-Fonun, which became known as "Nizam Yard". In 1921, the medical school was moved to Baharestan, Ekbatan Street, where it remained until 1932. Then, it was transferred to Saad al-Doleh's mansion on Lalezar Street and then to Dr. Hossein Motamed Hospital on Sheikh Hadi Street. Subsequently, in 1934, the School of Medicine was established as part of the University of Tehran (23).

In 1939, Dr. Yahya Adl (Figure 1) returned to Iran from France as a pioneer surgeon. Along with the global evolution of anesthesiology, he sought help from a French anesthesiologist named Boué to develop the field of anesthesiology in Iran. Boué used to anesthetize the patients in the Sina Hospital with "Ombredanne Masks" (Figure 2).



Figure 1. Professor Yahya Adl (1908-2003 AD)

One year after Boué arrived in Iran, Dr. Ali Far, a graduate in anesthesiology from England, began training doctors in anesthesiology at the request of Tehran Medical School. Approximately ten years later, completing a one-month course in the anesthesia department became mandatory for all medical students. He became the first associate professor of Tehran University in 1951.



Figure 2. Ombredanne Masks

Dr. Ali Far (Figure 3) is a pioneer in anesthesiology in Iran. He began his medical studies at Dar al-Fonun and completed them at Tehran University in 1944. First, he went to Sina Hospital, and under the supervision of Professor Adl and Dr. Boué, he devoted himself to learning anesthesia activities. Then, he was sent to Ahvaz. He first became a surgical assistant and started procedures related to anesthesia in Ahvaz Hospital. Two years later, Dr. Far went to the Royal College of Physicians in London with a scholarship from the Iran Oil Company. In 1950, he earned a specialized diploma in anesthesiology and subsequently returned to Iran.

In 1951, Dr. Ali Far was hired as the first anesthesiologist in Iran at Tehran University. Before him, Dr. Boué was performing general anesthesia using ether drops. He performed the first anesthesia at Razi Hospital using an anesthesia machine he had brought from England. In this historical operation, the patient underwent a successful gastrectomy surgery. Dr. Far performed the second anesthesia for Dr. Mir at Pahlavi (Imam Khomeini) Hospital, and also another one for Dr. Jahanshah Saleh at Women's Hospital. In addition to these public hospitals, the first anesthesia in a private hospital was performed at Mehr Hospital.

It is worth mentioning that Dr. Far reported some problems with the Marrett anesthesia machine to its manufacturer in England. After applying his desired changes, the Marrett 22 model was named after Dr. Far (Marrett Heads M.22 Dr. Ali Far Model). Another important contribution of Dr. Far to this field was

separating the anesthesiology department from the surgery department in 1968.

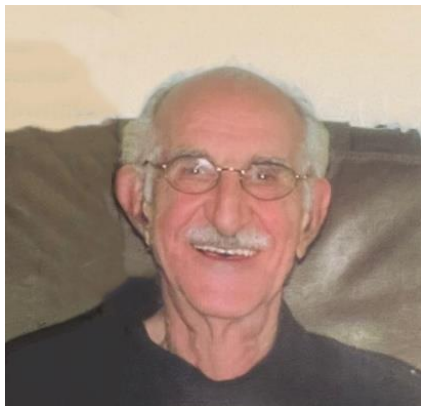


Figure 3. Dr. Ali Far (1916-2016 AD)

In 1954, Dr. Far recruited Dr. Abdollah Mortazavi into the anesthesiology group, and in the following year, Dr. Mohammad Esmail Tashayod, who had returned from the United States, joined them. Dr. Ali Far was in charge of the Anesthesiology Department of Tehran University until 1970. After this period, Dr. Tashayod took over this responsibility.

Dr. Tashayod (Figure 4) entered medical school in 1946. He completed the first Persian translation of "A Practice of Anesthesia" by Wiley Publications. In addition, he authored the book "Choosing the Method of Anesthesia" in 1965 as the first Persian reference book in this field. With the assistance of Dr. Abbas Kavousian, a physician of the Iranian Army, he also published the book "Pharmacology of Anesthetic Drugs."



Figure 4. Dr. Mohammad Esmail Tashayod (1927-2012 AD)

Among Dr. Tashayod's innovations, we can mention the invention of the "S. Tube", whose article was published

in the British Journal of Anesthesia. This tube, which was known as the "Tehran University Tube", was patented in Germany. He also invented the CPT tube (oropharyngeal cuffed tube) in 1992 and registered it in Iran's Companies and Industrial Property Registration Organization. The article related to this invention was also published in the British Journal of Anesthesia. This tube does not enter the trachea and avoids the complications associated with an endotracheal tube.

Dr. Hassan Hashemian, who was a famous surgeon, went to England with a government scholarship in 1932 and returned to Iran in 1956 after working as a physician in England. He performed surgery on cancer patients at Pahlavi Hospital (now Imam Khomeini Hospital) and had direct cooperation with Dr. Tashayod, an anesthesiologist of his team for 26 years.

Dr. Tashayod, in collaboration with Dr. Kazemi, who had returned from the United States, performed heart surgery and surgery with the help of hypothermia, first on dogs and then on humans (24, 25).

Dr. Bahmanyar Khozeimeh was the pupil of Dr. Tashayod and Dr. Far. With his efforts, the first comprehensive anesthesiology congress in Iran was held in Mashhad. He made significant contributions to the advancement of anesthesiology in Mashhad. After serving as the head of the department, this anesthesia pioneer in Iran participated in continuing education programs and regular conferences as part of his academic activities.

It is important to note that some hospitals, such as Sina, Najmieh, and Aria hospitals, served as pivotal training grounds for aspiring anesthesiologists. These institutions not only provided hands-on experience but also fostered a rich learning environment for young medical professionals.

The journey into the specialized field of anesthesiology began in 1960 with the initiation of the first residency training course, which welcomed just three residents. This marked the start of a significant chapter in the advancement of anesthesiology as a recognized medical specialty, alongside the formation of a centralized specialized board of anesthesia in 1974.

Dr. Akbar Bordbar (Figure 5), a medical graduate in 1956, was the founder of modern anesthesiology in Isfahan. His master and role model in choosing the field of anesthesiology was Dr. Ali Far.

Dr. Hojatollah Maleki was one of his residents. Also, Dr. Mahmoud Rahimi, who graduated in 1960, was his other resident together with Dr. Maleki since 1964. They completed the two-year anesthesiology residency course on an honorary basis without receiving any money. Later, Dr. Rahimi went to Germany and Denmark and completed the cardiac anesthesia course. In addition to founding the blood bank, he established the poisoning department at Khorshid Hospital in Isfahan. Other prominent anesthesiologists in Isfahan included Dr. Ahmad Bonyanian, Dr. Dibaei, Dr. Awan, Dr. Manouchehr Nouri, and Dr. Naser Fateh (23, 26).

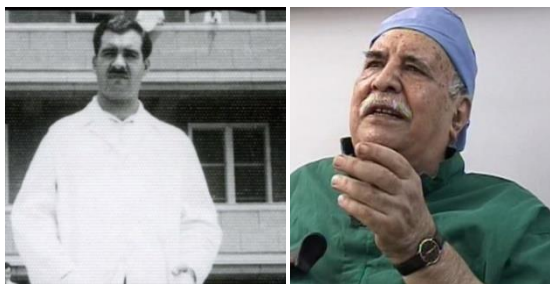


Figure 5. Dr. Akbar Bordbar (1929-2012 AD)

Among the other pioneers in the field of anesthesiology in Iran, we can mention Dr. Lotfi, who received his training in Boston, USA, and joined Namazi Hospital in Shiraz in 1957 at the invitation of Mohammad Namazi. Dr. Mohammad Hassan Esmaeili was also the first anesthesiology resident in Shiraz from 1960 to 1962, who went to Harvard University and Massachusetts General Hospital for two and a half years on the advice of Dr. Farrokh Saidi (23).

Dr. Abdolrasool Farboud, another pioneer of anesthesiology in Iran, became an assistant professor of the anesthesiology department at Jundishapur University of Ahvaz in 1974. He later continued his work at Shiraz University of Medical Sciences.

Dr. Ghobad Fathi was the president of Tabriz University who established the anesthesiology department in this university. In addition, he started the field of cardiac anesthesia with the help of Dr. Abbasgholi Daneshvar. Dr. Daneshvar performed the first mitral valve replacement surgery in Tabriz with his cooperation in 1969. Dr. Shapour Shahgoli also promoted the field of anesthesiology in Tabriz.

Dr. Sindokht Dahesh, who completed the general medicine course at the University of Tübingen, Germany, started her anesthesiology residency at the Imam Khomeini Hospital in 1966 under the supervision of Dr. Tashayod. After that, she trained as a specialist in pain medicine in Germany.

Dr. Hedayatollah Elyasi is a distinguished professor of anesthesiology at Shahid Beheshti University of Medical Sciences. He completed an anesthesiology residency at the University of Illinois in Chicago and trained under the supervision of Professor Alon P. Winnie in pain control.

Dr. Valiollah Tabibian started the anesthesiology residency course in 1973 at Firouzgar Hospital (Iran University of Medical Sciences) and graduated in 1976. His professors were Dr. Fotuhi and Dr. Badieli, both graduates of American universities.

Dr. Abbas Majidi and Dr. Reza Behnia were anesthesiology professors of Iran University of Medical Sciences. Dr. Valiollah Hassani was one of the residents of Dr. Tabibian who passed away during the COVID-19 pandemic. He became head of the Department of Anesthesiology after Dr. Behnia and later served as national board secretary.

The Iranian Society of Anesthesiology began its activities in 1976 under the name *Scientific Society of Anesthesia and Reanimation of Iran*. In 1979, it was renamed the *Iranian Society of Anesthesiology and Critical Care*, under which it continues to operate actively. The society is a recognized member of the World Federation of Societies of Anaesthesiologists (WFSA). Its first president was Dr. Abbas Majidi, who was accompanied by other members of the board of directors, including Dr. Mohammad Mesri,

Dr. Mohammad Taghi Saeidi, Dr. Morteza Badiei, Dr. Mahin Osanloo, Dr. Sharafabadi, Dr. Tashayod, Dr. Toosi, and Dr. Mahmoud Jabbari. Later, Dr. Reza Behnia, Dr. Samimi, and Dr. Homayoun Vakil also joined them. In 1980, after a period of hiatus, Dr. Saeedi, Dr. Samimi, Dr. Andalib, Dr. Shafiei, Dr. Behnia, and Dr. Arastoo Kimiavi became members of the board of directors. This society was reestablished through the efforts of Dr. Reza Behnia, Dr. Mansouri, Dr. Ali Mahfouzi, Dr. Seyed Ali Mirmozafari, and later by Dr. Hassan Mostafavi, and it has continued its activities to this day. The presidents of this society from its inception to the present have been Dr. Reza Behnia, Dr. Ali Mahfouzi, Dr. Mohammad Mehdi Ghiamat, and Dr. Alireza Salimi (Figure 6).



Figure 6. Opening of the 5th International Congress of Anesthesia, October 2007. From left to right: Alireza Salimi, Naser Fateh, Akbar Bordbar, Farrokh Saidi, Omidvar Rezaei, Alireza Zali, Mohammad Mehdi Ghiamat, Valiollah Hassani, and Mohammad Jafar Mansouri.

The oldest journal in the field is the “Iranian Journal of Anesthesiology and Critical Care”, a Persian-language publication with a history spanning over 40 years. Moreover, Iran has hosted dozens of international congresses and hundreds of national conferences and symposia on anesthesiology to date. Obtaining the scientific research license of the official journal of the Iranian Society of Anesthesiology, Dr. Mohammad Jafar Mansouri was responsible for the editorial of the journal from 1991 to 2001.

This journal was initially published as a bulletin from 1979 to 1985. The journal experienced a publication hiatus

between 1986 and 1991, after which it resumed in its current format as a scientific research journal.

The evolution of anesthesiology in Iran is a remarkable journey that highlights the dedication and ingenuity of its pioneers. From the early adoption of ether anesthesia in the mid-19th century at Dar al-Fonun to the establishment of formal training programs and specialized departments, Iran has made significant strides in this field. Pioneering figures such as Dr. Ali Far and Dr. Tashayod have played crucial roles in advancing anesthetic practices, introducing modern techniques, and fostering a culture of education and innovation. The establishment of key institutions like Sina Hospital and the development of residency programs have further cemented Iran's position in the global anesthesiology community. This rich history not only underscores the progress made but also serves as a foundation for future advancements in anesthesiology in Iran, ensuring the continued enhancement of patient care and medical outcomes.

Challenges of Anesthesiology in Iran and Future Perspectives

Anesthesiology in Iran has faced numerous challenges over the years. One of the primary concerns is the persistent shortage of trained anesthesiologists. According to the Iranian Medical Council, there are approximately 4,100 anesthesiologists in the country, with a male-to-female ratio of 1.8 (<2). Despite the growing national demand for surgical and critical care services, nearly 50%—and in some years up to 70%—of anesthesiology residency seats (a total of 305 capacity) have remained unfilled over the past five years. This indicates a systemic disinterest in the specialty, driven by factors such as lower income relative to other medical fields, high-stress work conditions, and unpredictable work hours.

Historically, the shortage of anesthesiology professionals in Iran was even more critical. Before 1981, the country faced a severe lack of qualified anesthesiologists. Many of the practitioners during that time were foreign nationals, particularly from India.

According to unofficial reports, only around 300 anesthesiologists were working in Iran at that time. Today, no foreign anesthesiologists are practicing in the country.

Nurse anesthetists, as non-physician providers in Iran, are not legally permitted to practice anesthesia independently or prescribe medications. In the past two decades, flawed healthcare workforce policies have contributed to a decline in anesthesiology enrollments, and in recent years, this trend has intensified. Additionally, economic disparities and limited professional incentives have led to increased emigration among trained specialists. Without strategic intervention, Iran is at risk of facing a severe anesthesiologist shortage in the near future—a concern that, while global, appears more pronounced in the Iranian context.

Another significant challenge lies in the uneven availability of modern anesthetic drugs and advanced equipment. Although the country has made strides in domestic production of some anesthesia-related medications and tools, certain regions still experience difficulty accessing up-to-date technologies. This situation has occasionally been worsened by international sanctions that restrict the import of advanced medical supplies, impacting the quality and safety of patient care.

Furthermore, although anesthesiology is taught at 36 out of 51 medical universities and supported by 10 research centers and six academic journals, there remains a pressing need to modernize training curricula. Continuous alignment with global scientific advancements is essential to prepare graduates for increasingly complex clinical scenarios. Collaboration with international anesthesiology communities could play a pivotal role in advancing education, facilitating technology transfer, and strengthening research. Furthermore, enhancing the overall income of anesthesiologists is a crucial consideration that policymakers need to address. It's essential to recognize the value these professionals bring to the medical field and to ensure their compensation reflects that importance.

Despite these obstacles, the future of anesthesiology in Iran holds promise. Targeted investments in graduate medical education—especially the expansion and modernization of anesthesiology training programs—are critical to addressing workforce shortages. Increasing governmental support and healthcare funding can enhance infrastructure and improve conditions in anesthesiology departments. Additionally, fostering academic exchanges and professional engagement through national and international congresses, of which Iran has hosted many, can support the specialty's development.

Anesthesiologists in Iran today not only staff operating rooms and intensive care units but also contribute significantly to chronic pain management and outpatient surgical services. The field's scope now extends to ambulatory surgery centers and office-based practices. Specialists have a vital presence in critical care medicine, occupying over 90% of ICU fellowship positions. Furthermore, demographic shifts—such as an aging population and rising prevalence of chronic conditions like obesity and diabetes—are reshaping the demands placed on anesthesiologists.

The COVID-19 pandemic highlighted the sacrifices made by these professionals, with 17 anesthesiologists officially—and 24 unofficially—reported to have lost their lives in service, including the national board secretary, Professor Valiollah Hassani. Their dedication underscores the indispensable role of anesthesiology in Iran's healthcare system.

CONCLUSION

The history of anesthesia and anesthesiology in Iran reflects a remarkable journey of scientific advancement, institutional development, and professional dedication. From the early integration of anesthesia techniques into surgical practice to the formalization of anesthesiology as a critical medical specialty, Iran has achieved substantial progress. Institutions such as the Iranian Society of Anesthesiology and Intensive Care and longstanding academic resources like the Persian translation of *Miller's Anesthesia* have contributed to this legacy.

However, the path forward demands strategic reforms. Improving compensation and working conditions for anesthesiologists, aligning training programs with international standards, and ensuring consistent access to modern technologies are essential steps. In the absence of such measures, Iran may face a worsening crisis in anesthesia services, especially as demand rises with increasing surgical volumes (currently about 5.5 million annually) and expanding ICU capacity (approximately 12,000 beds nationwide).

While technological innovations, including artificial intelligence, may assist anesthesiologists in the future, they are unlikely to replace the nuanced clinical expertise required for high-quality care in the near term. With thoughtful policy adjustments and sustained investment, Iran is well-positioned to overcome current challenges and ensure a vibrant future for anesthesiology, benefiting not only its practitioners but the broader healthcare system and, most importantly, the patients it serves.

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Conflict of interest

The authors declare no conflict of interest.

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