

# Medical Education in Armenia: An Overview

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**ABSTRACT:** This article serves to describe the medical education system of Armenia, a country located in the cross-section of Europe and Asia. Similar to other countries in the region, its medical education system is structured into undergraduate (6 years), postgraduate (1–4 years), and continuing education components. Its largest medical university, Yerevan State Medical University (YSMU), is the predominant institute for medical education and has enrollment of not only Armenian citizens, but also international students from India, Iran, Russia, and other countries. According to publication metrics, research activity at YSMU is increasing. Finally, the unique relationship between the country and its global diaspora has facilitated collaborative efforts in not only medical education, but also the delivery of care and capacity building. Significant challenges remain for each stage of medical education, such as the lack of standardized licensing or board examinations and oversight of the number of resident physicians per specialty.

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## Introduction

The Republic of Armenia, a former Soviet country which acquired its independence in 1991 and currently has a population of about 3 million people, has a well-established medical education system. Its first medical school was founded as a faculty of Yerevan State University (YSU) in 1920. In 1922, the faculty was physically moved to an independent building. In 1930, it became a separate entity and was renamed to Yerevan State Medical Institute, now known as Yerevan State Medical University (YSMU). YSMU is currently the only state-owned medical university in the country. Since its establishment, various private medical schools have been added to the landscape of education in the country. Over the years, the study of general medicine has been steadily increasing in popularity in Armenia, growing from 125 graduates per million people in 2011 to 187 graduates per million people in 2021.<sup>1,2</sup> Medical education has traditionally followed the Soviet organization of learning.<sup>3</sup> Unfortunately, a structured, extensive description of the medical education system of Armenia in the English language is not available in the literature to our knowledge. Thus, we sought to provide a detailed

overview of the training of physicians throughout the undergraduate, postgraduate, and continuing medical education (CME) continuum, which may be helpful for individuals who are interested in studying, teaching, and/or performing research in Armenia.

Following the completion of high school, students can pursue a medical career to become a physician by applying to one of the medical universities in Armenia. The application process includes an admission examination consisting of questions in biology, chemistry, and physics. Following acceptance and enrollment, formal medical education spans 6 years as a combined bachelor's and master's degree program. Roughly 3 thousand students are in general medicine programs (equivalent to medical school) across all institutes in the country. Successful completion of the degree program is equivalent to receiving a Doctor of Medicine (MD), which permits progression into residency medical training (*ordinatura*). Following residency training, physicians must fulfill CME requirements. Below, we describe the details of medical education for rising physicians based on the curriculum of YSMU, the only university that offers both an MD-equivalent



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program and postgraduate education, and graduates about two-thirds of all students pursuing general medicine in the country.

### Undergraduate medical education—medical school

The majority of students entering YSMU join the Faculty of General Medicine track. Each year is separated into two semesters (corresponding to September–January and February–June), with about a month-long period of examinations following the completion of each semester's coursework. The main subjects for the combined bachelor's/master's program are subdivided into 6 years (Table 1).

The 6 years of medical education are diverse in terms of both content and teaching style (ie, didactic and clinical). The first 3 years follow a lecture-based format in classrooms to deliver broad foundational knowledge in medicine, including fundamental theoretical topics (Years 1 and 2) and clinical subjects (Year 3). The final 3 years (Years 4–6) center on education in the clinical setting. Students rotate in cycles through a defined set of specialties to evaluate patients with attending physicians and gain exposure to the various fields in medicine, with each ranging from 1 week to 1 month and occurring at a single center or hospital. At the end of each rotation, students undergo an examination, either in the form of a written or oral assessment or a practical (where a specific case that the student was involved in is discussed).

Medical students may opt to also join the Faculty of Public Health for simultaneous completion of an additional degree (equivalent to a Master of Public Health). Specializations include infectious disease epidemiology, hygiene, and public health. Completion of this degree requires one and a half years of study. An alternative option is to simultaneously pursue another degree elsewhere. For example, a sample of YSMU students participates in the Master of Public Health program at American University of Armenia (AUA) every year.

At the end of the 6 years, students must complete the state medical examination (ie, final attestation) for successful graduation. The methodology of the examination is regularly monitored and reviewed and thus can change on a year-to-year basis. In 2022, the examination was split into three subjects: surgery, internal medicine, and gynecology. Final grades for each subject are based on three components: (a) practical knowledge, (b) written basic knowledge (computer-based multiple-choice questions), and (c) oral basic knowledge. The first component occurs in a simulation center, where examinees are evaluated on their ability to interact with and evaluate patients. The second component involves a 50-question multiple-choice examination per subject. The third component involves selecting and discussing a topic-centered article; for example, the article can focus on amyloidosis and the examinee must verbally answer questions related to pathophysiology, symptomatology, diagnosis, treatment/management, etc. This methodology will likely be altered in the future as YSMU is

**Table 1.** Courses required by year in the Faculty of General Medicine of Yerevan State Medical University as of the 2022–2023 academic year.

YEAR	COURSES
1	Armenian Language Bioorganic Chemistry English (or Other Foreign) Language General Chemistry Histology History of Medicine Human Anatomy Latin Mathematics, Medical Informatics, and Statistics Medical Biology Medical Physics Russian Language
2	Biochemistry Bioethics Histology Human Anatomy Medical Psychology Microbiology Normal Physiology Philosophy
3	General Surgery Microbiology Pathology Pharmacology Public Health Topographic Anatomy and Operative Surgery
4	Hygiene and Ecology Internal Diseases Medical Genetics Neurology Obstetrics and Gynecology Ophthalmology Otorhinolaryngology Public Health Rehabilitation Medicine Surgical Diseases
5	Endocrinology Epidemiology Infectious Diseases Internal Diseases Obstetrics and Gynecology Pediatrics Phthysiology <sup>a</sup> Psychiatry Surgical Diseases
6	Colorectal Surgery Family Medicine Forensic Medicine Infectious Diseases Internal Diseases Medical Genetics Obstetrics and Gynecology Surgical Diseases

<sup>a</sup>Equivalent to the study of tuberculosis.

currently in the process of implementing the Objective Structured Clinical Examination (OSCE). Beginning with the 2022–2023 academic year, the practical and oral basic knowledge components have been merged with the OSCE. The passing rate for students in the Faculty of General Medicine remains approximately the same per year, with 87% passing the state examination in 2022.

### *Considerations regarding compulsory military service*

In Armenia, all male citizens between the ages of 18 and 27 years have compulsory military service for 2 years with certain exceptions.<sup>4</sup> They are typically conscripted into the military at the age of 18 years. Several routes exist for male citizens who are interested in becoming physicians. A male student who receives a scholarship for their studies can sign a formal agreement with the Ministry of Defense that postpones military service until graduation from YSMU. Following graduation, he must serve as a military physician for 3 years. In contrast, a male student who does not receive scholarship funds can begin his studies after high school, but must pause his education to fulfill military service when he becomes 18 years old (often after Year 1 of medical school). He can return to his studies thereafter. A third option for a male student is to join the Faculty of Military Medicine instead of the Faculty of General Medicine for his medical education at YSMU. Students in the Faculty of Military Medicine are exempt from paying tuition and are trained under the same curriculum as the Faculty of General Medicine in addition to several military courses. After successfully receiving his degrees, he must work for the military as a physician for roughly 9 years in different regions of Armenia. Notably, YSMU is the only medical university in Armenia that offers education in military medicine.

### *International students*

YSMU has been a site of study for international students from 33 countries, including India, Iran, Russia, Iraq, Egypt, Jordan, Syria, Lebanon, and the United States.<sup>5</sup> Though about two-thirds of YSMU students undergo their instruction in Armenian, non-Armenian-speaking students can opt to have their entire medical instruction in either English or Russian. About 1400 international students study at YSMU due to its dedicated support system and the ease of adaptability in Armenia. This comprises roughly 40% of international students across all higher-education institutions in Armenia.<sup>6</sup> Following completion of the combined bachelor's/master's degree program, medical graduates typically pass medical licensing examinations in their home countries. Some also pass medical licensing examinations of the United States and United Kingdom and enroll in residency programs in the respective countries.

### **Postgraduate medical education—residency training**

If a trainee successfully completes the combined bachelor's/master's program and passes all components of the state examination, he or she can pursue residency training (*ordinatura*). For residency training, students are entitled to pursue specialties of their choice. No limitations exist regarding the number of students who can pursue a given specialty.<sup>7</sup> Furthermore, the state examination score is not considered to be a component

of candidacy. It is important to note that YSMU and the National Institute of Health (NIH), which functions under the supervision of the Ministry of Health, are the only two institutes legally permitted to provide postgraduate medical education in the form of residency programs according to a 1994 government decree.<sup>8</sup>

Once a student decides which residency specialty to pursue, YSMU organizes the placement process (ie, contacting a specialist at a hospital of the university's choosing). Residency training consists of varying tuition depending on the specialty. Scholarships are offered by the government and non-profit organizations for competitive students who have attained exceptional scores in their coursework and on their state examination. Outside of these scholarships, there is no limit on the quantity of residents who enter each field. There are currently 72 possible specialties to pursue for residency training under the oversight of YSMU (Table 2).<sup>9</sup> The duration of residency programs varies from 1 to 4 years. Residency training programs can focus on a single subspecialty (eg, pediatric hematology and oncology). However, unique circumstances exist for certain specialties. For example, if a medical student enters residency in pediatrics (a 3-year program) and later, after completion of residency, decides to pursue pediatric gastroenterology, he or she can gain additional training in this field outside of its standard residency program in a shorter time period. Additionally, medical graduates who also received a Master of Public Health may opt to pursue training in infectious disease epidemiology or hygiene.

Resident physicians work under the supervision of attending physicians at a single clinic or hospital and evaluate, often independently, the patient, including collecting history, performing physical examination, reviewing imaging and/or laboratory results, and drafting a treatment plan. Attending physicians evaluate and oversee patient care to ultimately confirm or adjust the treatment plan. For surgical specialties, the resident physician works directly with the attending physician in the operating room. At the culmination of the residency program, resident physicians must complete an oral examination with faculty members of their respective departments. Following residency training and successful completion of the oral examination, trainees typically remain at their institute/hospital to work full-time as attending physicians. Work settings include hospitals (most of which are public, ie, state-funded), polyclinics (state-funded), and private practice.

### **Continuing medical education**

CME has undergone multiple phases of transition in Armenia since the collapse of the Soviet Union.<sup>10</sup> Since 2016, the completion of 220 credits (not specialty-based) every 5 years is necessary for recertification of physicians. The first round of certifications covers the period of 2016 to 2023 (slightly longer than the expected 5 years due to its

**Table 2.** All 72 residency programs offered by Yerevan State Medical University that are available for medical graduates to pursue as of the 2022–2023 academic year.

Program	Duration (yr)	Program	Duration (yr)
Addiction Medicine	1	Microbiology	1
Allergy and Immunology	2	Neonatology	3
Anatomic and Clinical Pathology	2	Nephrology	2
Anesthesiology and Resuscitation	3	Neurology	3
Burn Medicine	2	Neurosurgery	4
Cardiac Surgery	4	Obstetrics and Gynecology	4
Cardiology	3	Oncology	3
Child Psychiatry	2	Ophthalmology	3
Clinical Pharmacology	2	Orthopedic Surgery	3
Dermatology and Venereology	2	Otorhinolaryngology	3
Diagnostic Radiology	2	Pediatric Allergy and Immunology	2
Emergency Medicine	2	Pediatric Anesthesiology and Resuscitation	3
Endocrinology	2	Pediatric Cardiology	3
Epidemiology	1	Pediatric Endocrinology	2
Family Medicine	2	Pediatric Gastroenterology	2
Forensic Medicine	2	Pediatric Gynecology	2
Gastroenterology	2	Pediatric Hematology and Oncology	3
General Surgery	3	Pediatric Infectious Disease	2.5
Hematology	3	Pediatric Nephrology	2
Infectious Disease	2.5	Pediatric Neurology	3
Internal Medicine	3	Pediatric Neurosurgery	4
Kinesiotherapy	1	Pediatric Ophthalmology	3
Laboratory Genetics	2	Pediatric Orthopedic Surgery	3
Laboratory Medicine	1	Pediatric Otorhinolaryngology	3
Maxillofacial Surgery	3	Pediatric Pulmonology	2
Medical Genetics	2	Pediatric Rehabilitation	2

(continued)

**Table 2.** Continued.

Program	Duration (yr)	Program	Duration (yr)
Pediatric Rheumatology	2	Reflexology	1
Pediatric Surgery	3	Rehabilitation	2
Pediatrics	3	Rheumatology	2
Phthysiology	1	Sex Pathology	2
Physical Therapy	2	Sports Medicine	2
Plastic Surgery	4	Thoracic Surgery	3
Proctology	3	Toxicology	2
Psychiatry	2	Transfusion Medicine and Blood Banking	1
Psychotherapy	2	Urology	3
Pulmonology	2	Vascular Surgery	3

Source: Yerevan State Medical University. [Clinical residency medical specialties]. Yerevan State Medical University. [https://ysmu.am/hy/page\\_list/klinikakan\\_ordinatura\\_fee/#tshash.af7KaCvC.WDuBhvtn.dpbs](https://ysmu.am/hy/page_list/klinikakan_ordinatura_fee/#tshash.af7KaCvC.WDuBhvtn.dpbs). Accessed January 12, 2023.

recent adoption). With this transition in the organization of CME, completion of CME credits for the first time became necessary to continue clinical practice. Satisfactory completion of credits during the 5-year period in addition to active clinical practice for a minimum of 3 of the last 5 years lead to the receipt of a certificate of professional activity. All aspects of CME are now monitored and regulated by the National Certification Centre for Professional Development (NCCPD), which is part of the NIH. The NCCPD is attempting to ensure that CME in Armenia follows international standards according to the European Accreditation Council for CME.

CME credits are subdivided into 3 categories: didactic, practical, and self-education/self-development.<sup>10</sup> Physicians must acquire at least 5 credits from each of these categories. These credits can be attained through the following mediums:

- Didactic: Participation in or organization of professional courses, seminars, conferences, and symposia in either Armenia or another country.
- Practical: Participation in or organization of hands-on professional development courses.
- Self-education/self-development: Participation in or organization of online courses in addition to publication of scientific literature.

## Standards and reforms in medical education

General standards across higher education (eg, degree system, credit system, and quality assurance) are primarily established by the Ministry of Education, while the specific curriculum of YSMU is developed alongside the Ministry of Health.<sup>7</sup> Following the formal adoption of the Bologna Process<sup>11</sup> by Armenia in 2005, major educational changes took place across universities, including YSMU. A significant change was the transition from a one-degree system (bachelor's degree) to a two-degree system (bachelor's and master's degrees).<sup>12</sup> Successful completion of all 6 years of study results in the combined bachelor's and master's degrees (equivalent to an MD). In other words, a student in the Faculty of General Medicine cannot solely receive a bachelor's degree. Examples of other modifications during this period included the transition from oral examinations to written multiple-choice examinations as the primary form of evaluation, increased frequency of knowledge assessment, and the establishment of a course credit system.<sup>13</sup>

As previously mentioned, about one-third of YSMU students are foreign citizens. In order to further promote the international recognition of YSMU, accreditation by relevant organizations is prioritized as a benchmark for its educational quality. Today, YSMU is in the process of attaining accreditation from the World Federation for Medical Education (WFME). A preliminary evaluation by an external committee of the integrated MD-equivalent academic program has been performed in preparation for formal assessment by the WFME. As a result, various changes in the academic program, including the syllabus, credit allocation to different subjects, and governance and administration, are being tailored based on WFME accreditation standards. For example, assessment of practical skills in the form of problem-based learning, case-based learning, bedside teaching, simulation software, and an in-person simulation center now harbors more weight in the curriculum.

## Research activities

Academic physicians from YSMU regularly perform clinical research in Armenia. This research is shared through various platforms, including journals and conferences. Locally, YSMU hosts two open-access scientific journals: *New Armenian Medical Journal* and *Medicine, Science, and Education*. The former publishes articles in English, while the latter publishes articles in either Armenian, Russian, or English with companion summaries in the other two languages (eg, if the full-length article is in the Armenian language, the summaries are in English and Russian). Physicians in Armenia also publish in other journals and participate in professional conferences internationally. According to Web of Science, a total of 1307 publications contains "Yerevan State Medical University" as an author affiliation from 1996 to

2022. These publications have garnered a total of 6964 citations. The breakdown of publications and citations by year is shown in Figure 1. For research requiring ethics approval, YSMU hosts an ethics committee (equivalent to an institutional review board), which meets on a regular basis to review research proposals (with the other being AUA which hosts an institutional review board).

## Diaspora engagement

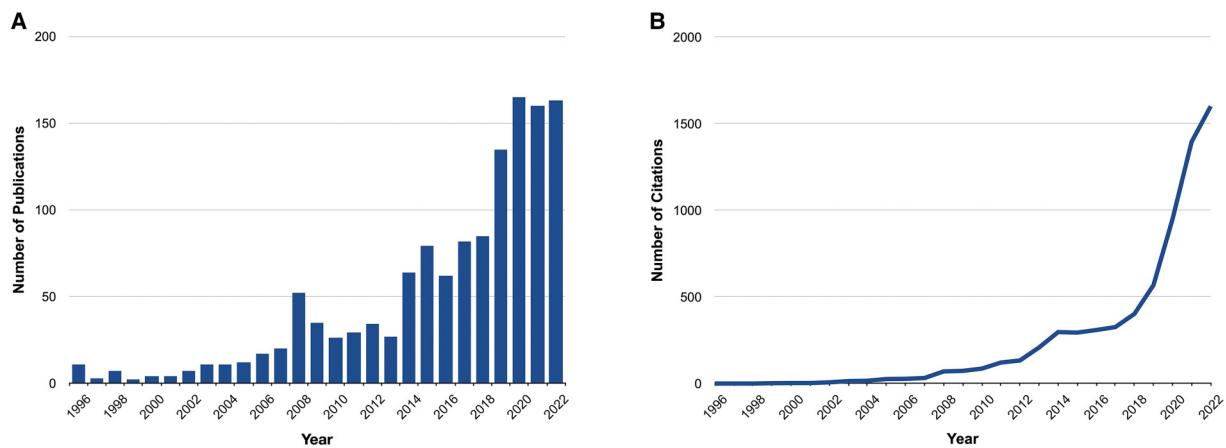
The Armenian diaspora retains active engagement with the medical education system of Armenia. Outside of Armenia (which has a population of 3 million people), 7 to 9 million individuals comprise the Armenian diaspora.<sup>14,15</sup> A number of diasporan students undergoes medical education in Armenia for various reasons. For example, high school graduates from the United States have the advantage of beginning their formal medical education immediately and obtaining their medical degree 6 years later (2 years earlier than the typical earliest possible timeframe). More recently, a wave of young ethnic Armenians from Syria, which has historically been home to a large Armenian community, has relocated to Armenia throughout the past 11 years due to the ongoing Syrian civil war, some of whom have studied at YSMU.

Furthermore, numerous diasporans are physicians in various specialties based in different countries, including the United States, Russia, and France. Throughout the years, ethnic Armenian physicians who have trained and currently reside in other countries have contributed their expertise to train medical students, resident physicians, and attending physicians in Armenia through visiting professorships at YSMU along with other activities in CME and training outside of YSMU. Such engagement is well received and fosters productive relationships to further advance medicine in the country.<sup>16</sup> Multiple Armenian healthcare medical associations operate throughout the world to facilitate opportunities for collaboration. Additionally, the Armenian Medical International Committee hosts a biennial conference known as the International Medical Congress of Armenia, which facilitates CME along with research and collaboration opportunities for local physicians.

## Areas for improvement

Based on standards established by the Liaison Committee on Medical Education (the accrediting body for medical schools in the United States and Canada),<sup>17</sup> we have identified certain challenges and limitations in the medical education system of Armenia.

In the context of undergraduate medical education system, several shortcomings are present. First, Armenia's medical education system is disconnected from the human workforce needs of the country. Armenia currently harbors a surplus of physicians, especially in its capital city of Yerevan, suggesting insufficient constraint on the number of graduates per institution.



**Figure 1.** Statistics related to publications including Yerevan State Medical University as an author affiliation according to Web of Science (1996–2022), including (A) number of publications and (B) total citations per year.

Second, various elements present in most medical schools, such as cadaver laboratories, problem-based learning modules, exposure to patient encounters during the early years of medical school, and revised curricula to reflect topics (including social determinants of health), are still missing. Third, opportunities for independent evaluation of patients in the clinical setting are limited. Medical students essentially accompany physicians during patient encounters throughout Years 4–6 of undergraduate medical education. Furthermore, student-run health clinics do not exist, which serve as an outlet for developing and practicing patient-centered skills. Fourth, a structured mechanism to explore additional specialties outside of the core curriculum (ie, in the form of electives) is not available. This may prevent exposure to specialties that students have a desire to explore in anticipation of residency training. Fifth, formal means for critical, objective evaluation of faculty by students and administrators have not been largely implemented. Finally, a single standardized licensing examination for all medical schools in the country is not in place. To ensure that core competencies are achieved on a regular basis, an intermediate state examination(s) in the middle of undergraduate medical education may be optimal (similar to the United States Medical Licensing Examination Steps 1 and 2).

Postgraduate medical education can be further enhanced as well. First, the absence of oversight or limitations on rising resident physicians admitted per specialty each year has been one driving factor for imbalances across specialties, leading to downstream shortages or excesses of physicians in particular specialties. For example, some specialties in primary care compensate poorly and suffer from shortages in the provinces outside of Yerevan. Second, tuition requirement (and lack of compensation) for residency training may pose an inconvenience or even hardship for training physicians at this stage of their lives. Third, there is a lack of enforced, minimum quantitative metrics to ensure that certain milestones are met (eg, number of surgical

cases, patients treated, competencies achieved, etc). This is further compounded by the absence of a standardized board examination by specialty, which renders it difficult to appropriately evaluate a rising attending physician. This may result in under-trained physicians. For example, specialty-specific knowledge gaps have been recorded among attending physicians in the country previously.<sup>18,19</sup> Fourth, there are again limited efforts to improve faculty development at this stage of medical education. In its current form, postgraduate medical education in Armenia is largely unstructured and requires high-level reform.

Research activity in medicine continues to grow in Armenia. Anecdotally, a small number of individuals are the primary drivers of publications from YSMU. In order to cultivate an environment of research, formal research education should be incorporated at all levels of undergraduate and postgraduate medical education.

### Comparisons with other post-Soviet states

Countries of the former Soviet Union harbor similarities and differences in the sphere of medical education. Medical education in these countries, carried over from the Soviet Union, largely follows the same organization of learning, particularly a 6-year course of undergraduate education followed by specialty-specific residency programs hovering in the same range of required years. Furthermore, given that most post-Soviet countries utilize Russian more often than English, it is not uncommon for medical trainees to incorporate resources in the Russian language for their studies and/or attend academic conferences in Russia. As previously mentioned, Armenia became a formal signatory of the Bologna Process in 2005, as did Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Latvia, Moldova, Russia, and Ukraine.<sup>20</sup> However, the remaining countries that formerly comprised the Soviet Union, including Kyrgyzstan,<sup>21</sup> Tajikistan,<sup>22</sup> Turkmenistan,<sup>23</sup> and Uzbekistan,<sup>24</sup> have chosen other sets of reforms for higher education.

## Conclusion

The Armenian medical education system has largely maintained its structure of training from the Soviet Union, though recent major changes include the adoption of the Bologna Process and various CME reforms. The system retains some commonalities with the training models of the United States and other countries. For example, medical school first focuses on pre-clinical education followed by clinical training, an extensive state examination is in place to ensure knowledge attainment, and CME is required for attending physicians. The commencement of medical school directly after high school, required military service for males, and tuition for residency training distinguish Armenia from many other settings. Despite ongoing changes in recent years, several challenges remain at each stage of medical education.

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