

# Preparations of Students for Enrollment in Medical Schools

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**ABSTRACT:** Improving medical education is an important process that changes from time to time based on the development of medical science and practice, society's need for a certain number of quality doctors, better preparations, and better selection of candidates for admission into medical schools. In most European countries, partial preparation of students for admission is done in secondary schools, and additional preparation is achieved in the first year of medical school. Such preparations enabled more than 60% of students to complete their studies, before the German Federal Ministry of Science and Education implemented the *Masterplan Medizinstudium 2020*. However, after a 4-year university preparation in the United States, close to 95% of students finish their medical studies on time. We proposed a 2-year university preparation for each student before his enrollment into the medical school because this strengthens his medical study, and later on, he becomes a better doctor. Thus, the number of graduated students may increase, medical studies could be shortened to 1 year, and candidates who do not enroll in medical school may continue their previous studies.

**KEYWORDS:** medical school, education, premed studies, Germany, Europe, United States

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## Introduction

Every medical school face 3 tasks: education of doctors, medical research, and treatment of patients. A school that performs all 3 tasks justifies its existence.

The vigorous, development of medicine peaked in Germany at the end of the 19th and the beginning of the 20th century. Its influence spread throughout Europe and later expanded to the United States. In parallel to medical research, medical doctors' education was also developed. At that time, numerous doctors and experts from various countries, including the United States, came to Germany for additional training. This level of medical science, clinical practice, and education of medical doctors was reached gradually over 5 centuries; the beginning started in 1388 with medical studies in Heidelberg.<sup>1</sup>

The most significant transfer of the experiences of German medicine to America was done by Abraham Flexner (1866–1959), an American psychologist and educator who studied in Berlin. His guidance book *Medical Education in the United States and Canada. A Report to Carnegie Foundation for the Advancement of Teaching* (known as the “Flexner Report, 1910”) prompted the Carnegie Foundation to establish 155 medical schools in America and Canada.<sup>2</sup> Flexner founded the pedagogical basis for medical education in Theodor Billroth's book *Medical Education at German Universities*, which states that medicine is a scientific discipline. According to this medical education system, Flexner says, students need to spend 2 years in laboratories, and then learn medical skills at university hospitals. So, the student completes 4 years of university (premed) studies, premedical subjects in laboratories for

2 years, and another 2 years in clinical subjects. Today, medicine is studied in the United States according to Flexner's model.

This historical overview of the development of medical education in 2 leading Western countries has the aim of presenting their intentions to develop a health system with medical schools that train doctors for optimal medical care. The paths of medical progress in these countries differed but today, medical education, medical practice, and medical research in the United States surpassed German medical growth. One of the reasons for this is the better preparation and rigor of the selection of students enrolling in medical schools. That preparation pays off later thanks to the innovations achieved and better service by each generation of doctors.<sup>3</sup> The best indicator presents the most popular destinations for German students when performing foreign rotations.<sup>4,5</sup>

## Medical Education in Germany and the United States

In the second half of the last century, Germany and America separated in terms of medicine. Germany developed universal health insurance, while insurance is private in America. In addition, medical education in Germany lasts 6 years and is financed by the state, while in the United States, it lasts 4 years for both types of doctors (MD or DO).<sup>6</sup> (Table 1). However, with the previous 4-year university preparation, medical studies last 8 years (Table 1).

Today, medical schools in Germany and Europe emulate those in the United States, and medical professionals have established extensive scientific and professional cooperation with American



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**Table 1.** Properties of medical studies in Germany and the USA.

PROPERTIES	GERMANY	USA
Population	83.2 million	293 million
Number of medical schools	42	159 allopathic* 41 osteopathic*
Number of inhabitants per one medical school	1.9 million	1.5 million
How many doctors work in the country (2021/2022)	421.000	1000.000
Admission criteria for medical students	High school and TMS	College (mainly premed type) and MCAT
The ratio of students enrolled in the first year and those applied	40%	43%
Length of medical study	6 years -Preclinical sciences 2 years -Clinical sciences 4 years	4 years -Preclinical basic sciences 2 years -Clinical sciences 2 years
Percentage of enrolled students who complete their studies	Above 60%*	Above 95%
Tuition at state or private colleges	Free	Premed: \$52 000/year Medicine: \$58 900/year at the state schools*; \$65 400/year at private schools
Medical studies in English (for strangers)	30.450 \$/year	300.000 \$/total
State exams	Three, the first is a 2-stage	Two, the second is a 2-stage
The first medical faculty established in the country	1388	1765

MCAT, Medical College Admission Test.

\*Allopathic medical schools train doctors for conventional (holistic) medicine (MD).

\*Osteopathic medical schools train doctors for conventional medicine who also perform osteopathic manipulative treatment (DO). Osteopathy is an alternative medicine that applies physical manipulation by the doctor's hands to the musculature and skeleton of the patient. In many parts of the world, osteopathic manipulations are not performed by medical experts, but by trained persons.

\*A student studying at a state university in his state (in-state resident) pays 10% less for medical studies. Students almost regularly take a "student loan"—federal or private. The federal one is more favorable, but the amount is limited. In addition, the student may work as a "demonstrator," and the medical school pays them.

\* Federal Ministry of Science and Education in Germany implemented the *Masterplan Medizinstudium 2020* in order to reform medical education and address the increasing demand for physicians. Now the percentage of enrolled students who complete their studies is close to 95%, according to the data from the German statistical office. However, we do not know do students finish their studies on time.

In Germany and many European countries, health care is provided with outstanding medical standards and sophisticated medical research is performed. However, the training of medical students in the United States and Germany is quite different. The most significant difference between the two systems is within the academic preparations. In Germany and the majority of European medical schools, academic preparation prior to medical school is done in the high schools, often called gymnasiums, while in the United States, it takes 4 years of college, mainly in the premed colleges. Another big difference between the 2 systems is the tuition costs. However, this obstacle does not seem to influence the popularity of medical school programs; applications in medical schools in the United States are even higher than in Germany. German physicians often leave to the United States, and the doctors from Eastern and Southern Europe replace them. Consequently, the United States has an inflow, and Germany has an outflow of medical doctors. To improve medical care in rural regions of Brandenburg, the medical school "Theodor Fontane" was founded in 2014 by municipal and nonprofit institutions to train more physicians, using the reformed medical curriculum, for the region of Brandenburg.<sup>7</sup>

universities. In addition to scientific and professional activities, medical education is better in the United States than in Europe.<sup>4,5,8</sup>

The pan-European university reform of higher education, including medical schools, was signed in 1999 in Bologna.<sup>9,10</sup> This declaration aims to enhance the quality of European education and improve the conditions for exchange and collaboration within Europe and internationally. However, some European medical schools, including the German Medical Association, do not accept this declaration due to the fear of introducing a fast-track "barefoot doctor."<sup>1</sup>

The preparation of students for medical studies is done in 2 parts. The first part takes place in the secondary schools

and the second in the first year of medical school. The main accent is on basic sciences—chemistry and biology. However, at the same time, some subjects of the preclinical segment begin in the first year, eg, anatomy and histology. The rest of the preclinical subjects, including clerkship and training in history taking and physical examination, are done during the second year. The clinical segment of studies and rotations lasts 4 years. In America, the medical curriculum lasts 4 years, a 2-year long preclinical segment, and a 2-year clinical training.<sup>11</sup> Considering the 4 years of premed studies, medical study in the United States lasts 8 years.

**Table 2.** Three models of medical studies.

STAGES AND EXAMS	FR GERMANY (EUROPEAN-MODEL)	UNITED STATES	PROPOSED MODEL
Preparations for medical studies			
Part 1	High school diploma	High school diploma	High school diploma
Part 2	In the first year at the medical school*	4 years of college*	2 years at university*
Preclinical sciences	2 years, including biology and chemistry	2 years	2 years
Clinical sciences	4 years	2 years	3 years
Licensing examinations	Part 1. After preclinical studies Part 2 After final year	Step 1. After the first 2 years Step 2. After clinical medicine Step 3. Knowledge of patient management	German type of licensing examination

\*Biology and chemistry at the university level.

Comparison of major characteristics of medical education in FR Germany (or European model), United States, and the proposed model. Part 1 or high school diploma, and reparations for medical studies are presented as Part 2. The latter is done in Europe in the first year of medical school. In the United States, it takes 4 years of college; in the proposed model, it takes 2 years at university.

### The Proposal of a New Model for Medical Studies in Europe

Studying medicine in America is more efficient than in Europe (Table 1). What would be worth taking from them? Some details have already been taken and presented at the Bologna Declaration. Those are mainly related to teaching methods (eg, small groups of students, closer contact between teachers and students, etc). However, the Bologna model did not change the preparation of students for medical studies, the most crucial element for improving professional training. Since the higher education system in Europe differs from the American one, it will be hard to request a 4-year university preparation.

An eclectic approach offers a solution.<sup>12</sup> A 2-year at the university where chemistry and biology are taught should successfully prepare students for admission to a medical school (Table 2). Consequently, in the preclinical segment of the curriculum, a student may devote more time to the preclinical sciences and clerkships. The 2-year preparation, which may take place at the regular faculties (eg, pharmacy, biology, biochemistry, chemistry, etc), enables the shortening of medical studies for 1 year. The curriculum should last 5 instead of 6 years. Knowledge of the above-mentioned preparatory subjects could be checked at the entrance exam corresponding to the Medical College Admission Test.

The main advantage of the 2-year university preparation of students is that a good knowledge of the basic sciences, biology, chemistry, and physics enables the easier study of physiology, anatomy, and biochemistry, and later, they provide better medical practice and research.

The best way to implement this 2-year program is to cooperate with medical schools and the Ministry of Education in one country. The incentive for this can also come from the recommendation of the Higher and Further Education Unit of the Education Department, the Council of Europe, and various European medical associations.

Another powerful stimulus that forces a student to study regularly is the study costs—most American students take loans during their medical training. The lucky ones are those whose parents can pay for their room and board, so they may graduate with less debt than many who do not have parental support. The average amount a student pays back is like a relatively expensive home. Regardless of debt, the majority of the U.S. doctors do not complain; their “6 figures salary” enables them to consider such a loan as “it is the best money I ever spent.” However, it is advantageous that in Europe, the vast majority of medical schools are state-funded, and students are free of tuition.

#### *Limitations of This Proposal*

The extension of medical studies from 6 to 7 years may cause concern for students and their parents who financially support them. However, a much smaller number of students will extend their medical studies (Table 1) as the majority of them shall pass all exams on time. Therefore, regardless of such concern, a number of candidates to study medicine will be at least twice as larger for admission at all faculties.

#### **Conclusion**

What are the advantages of this preparation for medical studies in Europe? In addition to the shortening of medical studies, 2 years (or even more) of premed preparation would ensure that better-prepared students start their studies.

Better preparation of students in basic sciences facilitates more efficient studying and ensures better further training of doctors for medical practice, scientific research, and other medical activities that are becoming more and more diverse. On average, students are at least 2 years older and academically more experienced, and those who do not enroll in medical studies could continue their studies at the university where they started. Various novelties introduced by the Bologna Declaration may remain at the medical schools where these

measures have already been introduced. All medical schools in Europe should change the unidimensional admission process to a holistic approach.<sup>13</sup> The cost that medical students in Europe have due to increase for one year is not a big problem. A much smaller number of students will extend their medical studies beyond 6 years (Table 1) as the majority of them shall pass all exams on time.

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