

Medical Education in the United States

Sérgio Torloni ¹, Paulo Mauricio Silva Lassance ², Mariana Carvalho Medeiros Alves ³,
Ana Paula Lottici de Brito⁴, Fábria Aparecida Carvalho Lassance ⁵

Abstract

These authors intend to provide a brief history of the medical educational system in the United States of America (USA), the educational structure, the current topics and challenges facing medical educators. The structure of medical education in the USA differs from most countries. In the USA it is not possible for a student to start medical studies after the completion of high school at the undergraduate level. A student must first complete a four-year undergraduate 'pre-medical' program at a college or university and obtain a Bachelor's degree before entering medical school. Upon successful completion of four years of study at medical school, the medical doctor (M.D.) degree is conferred after which physicians take three to seven years of residency training. The whole process can take from 11 to 15 years.

Key words: education, medical, student, United States

Resumo

Este artigo traz uma breve história do sistema de educação médica nos Estados Unidos da América (EUA), a estrutura educacional, os tópicos e desafios atuais que os educadores médicos enfrentam. A educação médica nos EUA difere da maioria dos países. Nos EUA não é possível ingressar no curso médico após o término dos estudos de segundo grau. O estudante que pretender cursar Medicina nos EUA, primeiramente precisa cumprir um programa “pré-médico” na universidade e obter um título de Bacharel. Após a formatura, os médicos recém formados partem para a residência médica que pode variar entre três a sete anos de treinamento. No geral o processo de formação médica nos EUA pode levar de 11 a 15 anos. Para receber o título de “Medical Doctor” (M.D) o estudante precisa cursar quatro anos de medicina e fazer pelo menos uma residência médica.

Palavras chave: educação médica, estudante, Estados Unidos

1. Stem Cell Therapy, Apheresis. Intraoperative Salvage. Mayo Clinic Hospital. Dept. of Laboratory Medicine & Pathology

2. Professor of Undergraduate Medicine Course of Catholic Brasilia University, Brasilia, Brazil

3. Undergraduate Medical Student of Catholic Brasilia University (2010 – 2015), Brazil Scientific Mobility Program Student (2012-2013), Researcher mentorship of Catholic Brasilia University, Brasilia, Brazil

4. Undergraduate Medical Student of Catholic Brasilia University, Researcher Mentorship of Catholic Brasilia University, Brasilia, Brazil

5. Professor of Undergraduate Medicine Course of Catholic Brasilia University, Brasilia, Brazil

E-mail do primeiro autor: torloni.sergio@gmail.com

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Introduction

Medical education and preparation of the next generation of physicians differs significantly throughout the world. The most important variables are 1- Having an appropriate curriculum, 2- Dedicated instructors, 3- Early education contact with patients and most important nowadays is access to technology. The aim of this article is to describe the organization, oversight and delivery of Medical Education in the United States.

Historical Background

The United States was colonized in great part by immigrants of European origin. Although a significant number of immigrants of oriental descent settled in the West Coast - mostly California -, the influx from Asia was stopped in the late 1800's.

A little known fact is that the commander of the Mayflower, ship that brought the first settlers to America, Miles Standish was a traditional physician as well as an officer of the British Army. Therefore Dr. Standish was the first known physician to practice in America.¹ Early settlements were in the East coast, namely Williamsburg, currently in the State of Virginia. In a matter of decades a rapid move towards the west was encouraged by the availability of free land as well as later reported the discovery of gold in California and Nevada, fuelled the dream of a better life and fortune.

For the most part neither was achieved. A number of immigrants settled in the central plains endured harsh winters and vast distances between settlements, and had to fend for themselves. Many went all the way to California and established what in time grew to very large cities like San Francisco and Los Angeles. Early settlers were poorly served in the area of healthcare. Mortality was high, life expectancy was low. Most individuals never saw a physician during their entire life. One was more likely to see a barber-doctor than a traditional doctor. With time, more educated individuals came to America amongst them physicians. Although the quality of medicine practiced back then, was quite primitive, it was at least a start. Medical licensing started New York in 1806. The State licensed individuals to practice medicine and a \$25 fine was instituted for unqualified practicing Medicine. Over the next 200 years the practice of medicine became more and more regulated leading to the current structure where each State has a Board of Medical Practitioners, a regulatory body that is staffed by physicians, who oversee physicians and has the power of granting, suspending or revoking a Medical Certificate.

Medical Education in the United States

Pre-requisites

Medical School in the United States is a post-graduation course. A College Degree is

required as a pre-requisite for any applicant. A College Diploma BS, BA, usually involves a four year course, but some may finish it in less time. The Higher Education Diploma need not be in an area of science, but usually requires pre-requisite courses regardless of the Bachelor's Degree (Table 1). Actually some Medical Schools prefer that the Bachelor's

degree not be in the area of science, but rather a degree in sociology, literature, foreign languages, in order to have a well rounded applicant, with broad exposure than one that has no social skills or other knowledge outside sciences. Being a physician requires social skills, good interpersonal skills, as well as the scientific skills.

Table 1: Undergraduate Courses Required. (One year minimum).

General Biology
Physics*
General Chemistry*
Organic Chemistry *
Calculus
English
Sociology
Psychology
<i>*to include hands-on laboratory.</i>

GPA (Grade Point Average)

The GPA is a cumulative average of all of your grades during studies for a Bachelor's Degree. The scale ranges from 1 to 4.0. GPA is an important indicator of the student's ability to learn new material at a fast pace and reflects dedication to the specific area of study the student has chosen. Therefore it qualifies the student for post graduate work. The GPA is also an indirect reflection of maturity, since partying more than studying in college will most certainly adversely affect the GPA.

It must be said that College Education is

a reality check for many that enter college. Public Middle School and High Schools have in the United States fallen way short of the goal of preparing an individual for College. In High School - 10 to 12 grade -, besides the core education of basic Mathematics, English, Science and possibly a foreign language, the rest of the courses are electives. Unfortunately a large percentage of students are not mature enough to make wise choices in their electives and therefore decrease their preparedness for a University education. For example, one could choose an elective in Ceramics, Workshop,

Home economics rather than choosing to continue studying more appropriate topics such as Geometry, Advanced Algebra and Calculus. Basic mathematics that is part of the curriculum, does not prepare an individual to go into Calculus in college. Students who are failing a course can usually ask for more projects, as well as retake a test they have failed in order to increase their grade. The quota system has in the past exposed these shortcomings; a significant number of students who start college do not have the reading level required in college and drop out.

The Scholastic Aptitude Test (SAT) is a standardized test that is given on the same day at all high schools in the country. The SAT scores reflect the student's abilities in Mathematics, Writing and Reading. The maximum cumulative scores go from 0 to 1600. The higher the SAT score, the more likelihood to get into a well known University. The SAT is therefore the "great equalizer", that is, those students who chose to study advanced math, science, literature, writing classes, will undoubtedly achieve a higher score than the student who chose "an easy life" with easy courses.

Unfortunately, in the United States, the educational system is failing to provide all the children with a good solid basis for college. Once students enter college, the learning pace is

fast and a lot of material is given in class. One must have the maturity and the discipline to prepare for class, study in order to succeed. In college there are neither additional projects, nor retake of a failed test - unless a very large percentage of the class has failed: which in turn reflects negatively on the instructor. Therefore, a certain percentage of students drop out of college during the first year because the lack of preparation, maturity, discipline that is required for higher education. These students will usually end up on a two year course and obtain an Associate Arts Degree, usually in computers, mechanics. Others will enter trade schools – mechanic, carpenter, welder, etc.

MCAT (Medical College Admission Test)

The MCAT can be considered an equivalent to the SAT for those who have completed four years of college and are seeking entrance to a Medical School. The test is developed by the American Association of Medical Colleges (AACC).² The AACC is a not non-profit organization representing 137 accredited American Medical Schools and 17 Canadian Medical Schools. These schools are associated with 400 major hospitals, 48 Veteran's hospitals, 90 academic societies. A total of 128.000 faculty members, 75.000 medical students and 110.000 residents.³ The test is based on topics listed on table 1. The test

asserts the performance of the student in these topics as well Critical Analysis and Reasoning Skills. An estimated 80% of students taking the MCAT test do take preparatory courses offered by private schools. Some Medical Schools will only accept prospective students that have scored in the top 1 to 2% of the test grades - have scored better than 98% of other applicants that have taken the MCAT.

Additional Extracurricular Activities

Since the beginning of high school, students who are interested in going to Medical School opt to get involved in research or “shadow” a physician summer vacations. The purpose of this activity is mostly understand what it is really like to be a physician or a researcher. This serve to give the student a clear idea of what one getting into and to realize that being a physician is not always as glamorous as TV and entertainment industries make it appear. Following a physician for a period of time will show to prospective doctors, that there is more to Medicine than seeing patients. Writing or dictating notes, interpreting lab results, consulting with colleagues from different specialties, as well as attending meetings, completing forms for billing purposes take a large part of the physician’s time. Although a letter certifying that the student shadowed a physician is an important personal

stimulus, this adds very little to the Medical School Application, but shows the applicant is serious about pursuing a career in medicine.

Volunteer service

Volunteer service for someone who intends to pursue a medical degree, should be directed to an area of research. Instead of dedicating their time to bring flowers and newspapers to the patients, one must find a way to get involved in a project. This will serve two purposes; first it will give the individual laboratory experience which will be very important in the future. Additionally, getting involved in a research project, the learning experience is great and very enjoyable and teaches the student to work in a focused group. Best yet, is the fact that depending on the type of involvement, the student’s name may be included in a peer reviewed publications. This will certainly carries some weigh and gives an advantage to the prospective student when applying for Medical School.

Medical Curriculum.

The medical curriculum varies widely from School to School. Nevertheless, the first two years have the bulk of basic sciences, as well as anatomy, physiology, pharmacology, microbiology and pathology of disease. Lectures take place in large auditoriums and

usually are not mandatory. With the availability of media nowadays, the lectures are recorded and available anytime. Transcripts of the lecture are also taken by shorthand clerks and made available for sale to the students. Lectures are usually followed by a laboratory practice and small group discussion. Usually in some Medical Schools, the small groups that are formed stay together for the rest of the entire course. The small groups facilitate personal interaction between students of different backgrounds. In some Medical Schools a deliberate effort is made to include students who are shy, or have difficulty in interpersonal communication with students who are talkative, and have leadership skills.

Lectures are based on textbooks that serve as a guide for study. Nevertheless, the students are encouraged to look at outside sources as well to understand the topic being discussed. Preparation for small group sessions is required and discussions are based on the material covered in lecture. This is formatted in such a way that is not purely didactic and the student is regurgitating what has been memorized, but rather how the information is applied in real life. Preparedness and participation in small groups is mandatory and is part of the grade for every course.

Evaluation of Medical Curriculum, Medical Students

While every medical school has certain freedom as to what the curriculum should contain and the method of delivering it, every medical school is held and graded by the same standards.⁴

At the end of the second year, which include basic sciences - cell biology, biochemistry, pharmacology, physiology, microbiology - all students have to take National Medical Boards part I. NMB is a test compiled by ACGME, is the national standard that evaluates not only the student's performance and ability to continue on to the more clinical parts of the curriculum - years 3 and 4 -, but also evaluates the medical school itself. The percentage of students passing NMB part 1 is a direct reflection of the process of selection of students, as well as the effectiveness of the curriculum. Schools that have an unacceptably high percentage of their students failing this national test several years in a row will be put on probationary status. These schools will be visited and evaluated by ACGME, recommendations will be made and results are expected after changes in curriculum, methods of delivery, as well as faculty qualifications.

Usually, this result in NMB scores' improvement and the school is allowed to continue to be licensed. Should the trend continue, the accreditation of the medical school will be revoked.

Clinical years (3 & 4)

The clinical years are well structured to give the student basic clinical skills, to expose the student to the basic specialties such as Internal Medicine, Surgery, Obstetrics and Gynecology and Pediatrics. They are also expected to learn how to communicate with peers, nurses, custodians, etc. Students are also expected to dress appropriately and appear professional. A dress code is made available at the beginning of the 2nd year. Although all specialties are covered time is reserved for electives in specific areas within the medical school or at any teaching hospital in the country. Arrangements for external rotations are initiated by the student.

The education office will usually assist finding rotations and facilitating arrangements for the student's rotation. A list of goals is established for each rotation. A preceptor is in charge of evaluating the student during and at the end of the rotation. This evaluation is taken very seriously and will become part of the student's permanent record. By the end of the fourth year, before graduating from medical

school, students have to take a national test - National Medical Boards part 2. This test focuses in clinical areas, involving differential diagnosis, appropriateness of test ordering, interpretation of radiology films, blood gases, acute care, chronic care as well as assuring the student has a good understanding of the basic areas - surgery, medicine, OB-Gyn, pediatrics, psychiatry. In general, students completing their clinical years are able to score high in this test. Medical students will only be able to graduate from Medical School by passing part 2 of the NMB. Once graduated, they will not be issued a license to practice, until they had at least two or more years of training, or on the job activity.

Residency

Nearly 100% of graduating students will go on to a residency program. Residency programs are pretty standard, and range from three years - Medicine, Pediatrics - to four years for Radiology, Psychiatry and Pathology. Surgery requires a minimum of four years for General Surgery, or two to three years of General Surgery and three or more years of specialized surgery - Cardiovascular, Transplant and Oncology. Neurosurgery is usually an additional four or more years. All programs except Pathology require one year of rotating internship before concentrating in the

specialty area. During residency, students will work with a temporary medical license, under the supervision and responsibility of a licensed physician. Also in residency, the physicians will take NMB part III, concentrating in areas previously described. All is based in a solid core of basic sciences, and how they apply to the practice of medicine. After passing NMB part III the resident is eligible to apply for a medical license, therefore they have the ability to work on their own without supervision.

Specialties

Going into a clinical specialty, requires a solid background in internal medicine. So Specialties such as Hematology/Oncology require three years of internal medicine and its board certification before being considered for the program. Periodic evaluations are done during the course of training. Evaluations include not only clinical knowledge, but also communication skills, which are held as an equal standard. Nurses are frequently asked for input for an evaluation. Residents who show a lack of respect, lack of communication skills, are informed of these issues, and are expected to have these resolved by the next evaluation. Residents who are great clinicians and lack respect and communication skills will be required to address this specific area. Repeated lack of skills in one of these areas may result in

probation and if not addressed successfully may serve as a basis for termination but this rarely occurs.

Discussion

In comparison with the Brazilian medical education system, it is easy to notice a number of differences. Beginning with High School education, in Brazil, there is a closed and rigid curriculum to be accomplished, which cannot be personalized for each student. In other words, independent of one's choice of degree in college, every student must take all the subjects: Portuguese, Mathematics, Chemistry, Physics, Biology, History, Geography, as well as Philosophy, Sociology and Arts. In order to join college, Brazil still is adapting the unification process. The proposal of ENEM (Exame Nacional do Ensino Médio) is similar to the SAT test, which ranks all Brazilian students with a singular test. Besides, some universities keep the admission exclusively by its own exam. Therefore, if the student wishes to study at a specific university which has not adopted the ENEM method yet, he will have to take a different admission exam.

After joining university, the student attends six years in Medical School. In the first couple of years, basics subjects are taught, such as Biochemistry, Anatomy, Physiology and Pathology. Third and fourth years are

composed by the Clinical cycle, in which the student learns Cardiology, Pneumology, Pediatrics and Surgery. Finally, in the last two years they have Internal Medicine, which is mostly practice at the hospital in diverse areas, with some institutional tests. Then, the student receives the degree as a doctor, which means he can practice medicine with a license, unsupervised. However, if one wants to take a specialty degree, he must apply to a Residency Program, which is an optional and supervised course in a specific area, with a scholarship.

It is not easy to establish a comparison between the American and the Brazilian educational systems, due to the large number of legal differences. For instance, in the so called residency in USA, the undergraduates have a temporary license, which will turn permanent only after the conclusion of the course and approval at the NMB III. In Brazil, residents already have a license, and the residency would be equivalent to an optional post-graduation, even though it is widespread in practice. Besides, during graduation, the Brazilian student has the opportunity of joining a University Exchange Program, from six months to a year in a foreign institution, funded by the government and known as “Ciências Sem Fronteiras” (“Brazil Science Without Borders”).⁵ It is basically a scholarship with allowance for housing and transport, which

consists in a great experience for the student, who will return to his original University with a different view and a greater knowledge. The Program can be taken in various cities in Europe, Canada, USA and Australia.

A new horizon is opened for that student. He gets the chance to learn Medicine, practice another language, and learn how to deal with a new culture and different people - which is extremely important to his professional life and future career. He also gets to know how good his learning process is, when compared to his new colleagues/university.

As it is traditionally defined, the educational continuum for medicine includes undergraduate medical education, graduate training and continuing medical education. Because this educational continuum intersects with medical licensure, undergraduate and graduate medical education are major partners in supporting state medical boards' mission to protect the public health, by ensuring that it is qualified. Competent physicians are entering the licensee ranks. Therefore, a fundamental obligation exists on the part of graduate medical education to assist state medical boards in their fundamental mission.

The fact that the USA have over 150 medical schools,⁶ thousands of medical education programs, with a strong basis of educational research programs and a training

process that has standardized tests for every stage of a medical student training, makes its educational system one of the most strong and solid systems in the world. Since the year 2000, the medical education system has been passing through many changes, such as the curriculum reform and the appreciation of other important skills in the medical formation in order to preserve the certification throughout the years of education.

The goal in changing the educational process is to focus on other skills besides knowledge, involving the patient sooner in the process and using better educational strategies. However, there is lack of clear evidence if this reform results in better physicians. In addition, the current structure is threatened by the governmental debt crisis.⁷ Considering the future changes, the system will have to focus on finding which strategies will result in better physicians and how to fund the system over the long term.

Conclusion

As any other country, the medical education process in the United States is made of the applicants' dedication since his early years. The student must have to choose subjects wisely and have impressive grades in High School, added to extracurricular activities and volunteer work. Besides that, he must study

hard and also know how to deal with the patients, having noticeable social skills. As we can see, the educational process consists of at least 11 years of hard work. In addition, besides the student's aim to succeed, the robust educational system is primordial to keep leading these doctors into a great generation of health professionals. To do so, the system must continue evolving in order to get even better outcomes.

References

1. A history of Medicine in America. (Access in Jan 20 2015). Available at www.mnwelldir.org/docs/history/history01.htm
2. AACC American Association of Medical Colleges. (Access in Feb 05 2015). Available at <https://www.aamc.org/students/download/266006/data/2015previewguide.pdf>
3. US /Canadian Medical School and Teaching institutions. (Access in Feb 23 2015). Available at www.aamc.org/newsroom.
4. American Medical Association. Requirements for Becoming a Physician (Access in Mar 12 2015). Available in <http://www.ama-assn.org/ama/pub/education-careers/becoming-physician.page>

5. Ciências sem Fronteiras. O Programa
(Access in Mar 20 2015). Available in
<http://www.cienciasemfronteiras.gov.br/web/csf/o-programa>
6. Dezee KJ, Artino AR, Elnicki DM, Hemmer PA, Durning SJ. Medical education in the United States of America. *Med Teach*. 2012; 34(7):521-5.
7. O'Shea JS. Reforming Graduate Medical Education in the U.S. *Background*. 2014; 2983:1-12.
8. Federation of State Medical Boards. *A Guide to the Essentials of a Modern Medical Practice Act*, Tenth Edition. (Access in Feb 02 2015). Available at http://www.fsmb.org/grpol_policydocs.html