



The Medical Education of Physicians

BACKGROUND
PAPER NO. 73

JONATHAN SAXTON, *Consultant*

FEBRUARY 17, 2010

OVERVIEW — This background paper provides a descriptive overview of the process of education, licensing, certification, and continuing education involved in becoming and continuing to practice as a physician.

National Health Policy Forum

2131 K Street, NW
 Suite 500
 Washington, DC 20037

T 202/872-1390
F 202/862-9837
E nhpf@gwu.edu
 www.nhpf.org

Judith Miller Jones
Director

Sally Coberly, PhD
Deputy Director

Monique Martineau
*Director, Publications and
 Online Communications*

Contents

Background 3
 Figure 1: The Four Phases of Medical Education 3
 Prerequisites for Medical School Admission 4
 Figure 2: Percentage and Number of U.S. Allopathic Medical
 School Applicants, by Race and Ethnicity, 2007 6
 Understanding the Medical School..... 7
 Medical Education 8
 Curricula..... 8
 Assessment and Licensure..... 10
 The Residency Match 11
 Graduate Medical Education 12
 Figure 3: Approximate Length of Select
 Graduate Medical Education Programs, by Specialty 13
 Obtaining and Maintaining the Medical License 15
 Board Certification and Maintenance of Certification 16
 Continuing Medical Education 17
 Endnotes 18

The National Health Policy Forum is a nonpartisan research and public policy organization at The George Washington University. All of its publications since 1998 are available online at www.nhpf.org.

Becoming a practicing physician involves a rigorous course of education and training that occurs in four distinct phases (Figure 1). **Phase one** involves completing the admission requirements for medical school through pre-medical courses at a four-year (undergraduate) college or university. **Phase two** involves completing medical school, often referred to as undergraduate medical education (UME). **Phase three** involves completing post-medical school training (residency and fellowships), known as graduate medical education (GME), including meeting national and state licensing requirements. **Phase four** involves maintaining competence, licensure, and hospital privileges by participating in continuing medical education (CME) and by attaining and maintaining “board certification” in a chosen specialty.

This process of becoming a doctor was established in the aftermath of a report commissioned by the Carnegie Foundation in 1910 that became known as “The Flexner Report,”¹ after its author Abraham Flexner, a prominent educator and scholar. The Foundation commissioned the report in response to serious concerns raised over many years by leading physicians and intellectuals about the chaotic and, in many ways, dangerous state of American medical education. At the turn of the 20th century, much of what passed for medical education consisted of unregulated private academies and schools that produced poorly educated and unprepared medical practitioners.

FIGURE 1
The Four Phases of Medical Education



Adapted from U.S. Government Accountability Office (GAO), “Graduate Medical Education: Trends in Training and Student Debt,” GAO-09-438R, May 2009; available at www.gao.gov/new.items/d09438r.pdf.

Medical education in the United States was of such poor quality that more than 15,000 Americans traveled to Germany to study medicine between the end of the Civil War and the First World War.²

The Flexner Report spurred a public mandate to reform medical education. Schools increasingly became affiliated with universities, and a disciplined four-year course of study rooted in the biomedical sciences and clinical hospital-based learning became the standard of medical education.³

PREREQUISITES FOR MEDICAL SCHOOL ADMISSION

Admission to medical school—either allopathic, which grants the doctor of medicine (MD) degree, or osteopathic, which grants the doctor of osteopathy (DO) degree—generally requires completing an undergraduate degree in a four-year college or university. Approximately one-quarter of medical schools have relationships with an undergraduate program such that they provisionally accept a few select students graduating from high school, or after a year or so of college, into a combined BA or BS/MD degree program. This enables some of these students to complete their undergraduate and medical degrees in as few as six or seven years, rather than the conventional eight years.

Medical school admission requirements vary in their particulars from school to school but almost always include courses in the natural sciences, including biology, chemistry, physics and mathematics. Most schools also look for strong performance in the social sciences and humanities and in critical reasoning and written communication skills. Evidence of commitment to medicine or to biomedical research is also important, as demonstrated by participation in summer internships, research assistantships, and other relevant experience.

Historically, approximately 70 percent of the applicants to medical school have majored in the natural sciences, mathematics, or statistics; about 15 percent have majored in humanities or social sciences; and an additional 15 percent have majored in other subjects.⁴ Acceptance rates do not vary significantly based on undergraduate major. The average grade point average (GPA) of students admitted to medical school in 2007 was 3.65 (out of 4.0), and the average science GPA was 3.59. All but a few programs require applicants to take the Medical College Admission Test (MCAT), a standardized examination that assesses applicants' aptitude in the areas of verbal reasoning, physical sciences, biological sciences, and writing. The MCAT is administered

by the Association of American Medical Colleges (AAMC).⁵ Both GPA and MCAT scores are weighted heavily in admissions decisions.

The majority of students go directly to medical school from an undergraduate institution. However, approximately 15 percent of medical students are admitted after completing additional “post-baccalaureate” programs now offered at well over 100 universities. Such “post-bac” programs enable students to take or repeat some or all of the prerequisite science and mathematics coursework required for medical school admission. It is also not uncommon for applicants to have worked for some time after college before applying to medical school.

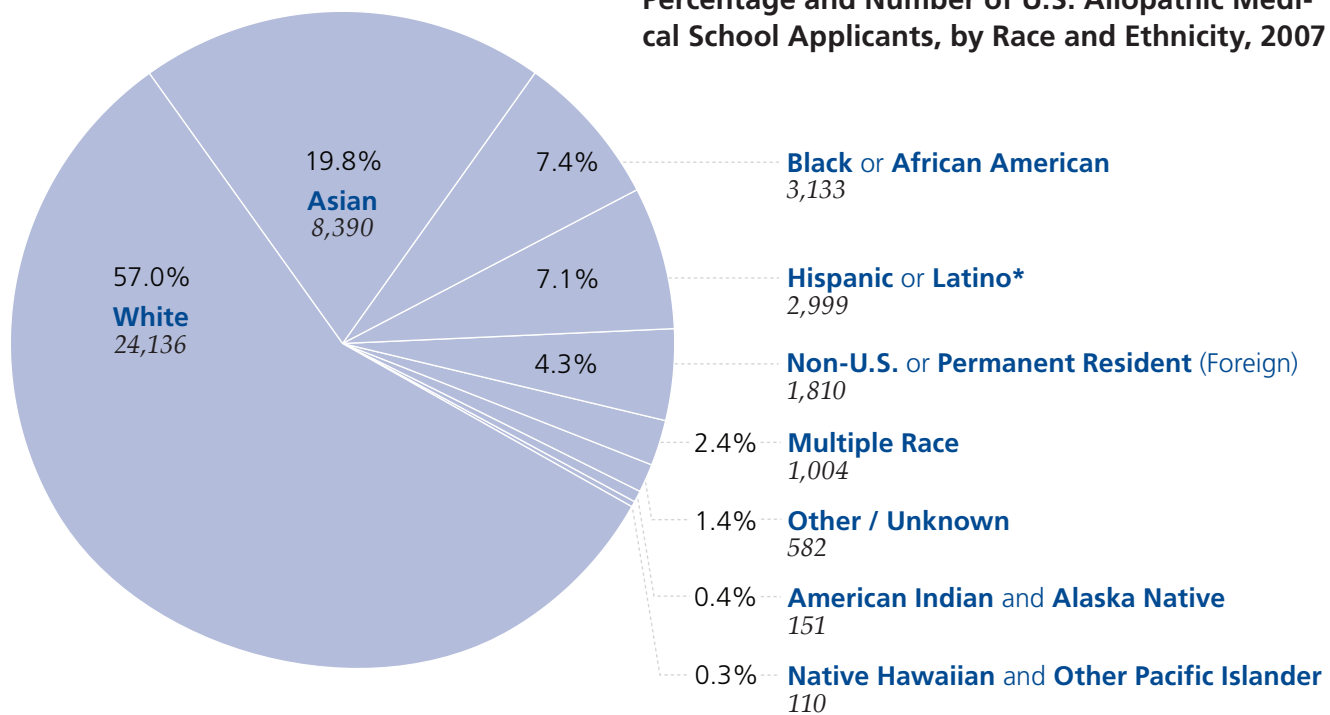
Generally, between 35,000 and 45,000 individuals apply for admission to allopathic medical schools each year. Approximately 18,000 are admitted. The most competitive schools can receive as many as 8,000 to 10,000 applications for 100 to 200 spaces. Most allopathic schools participate in a centralized application service run by the American Medical College Application Service (AMCAS). The AMCAS in 2009 reported that 42,269 applicants (including 31,063 first-time applicants) submitted 562,694 allopathic medical school applications, an average of 13 applications submitted per prospective student. For osteopathic schools, the American Association of Colleges of Osteopathic Medicine (AACOM) reported in 2009 receiving 92,557 applications from a record-high 12,617 applicants for 4,698 osteopathic medical college seats.⁶ This represents almost a doubling of applicants since 2002. The majority of students entering medical school are between 21 and 28 years old.⁷ The number of women applying and matriculating to medical schools has increased significantly over the past few decades. Forty-eight percent of the applicants for the entering class of 2009–2010 were women and 52 percent were men.⁸

The record on racial and ethnic representation is not as robust. While overall applications and enrollment of minority students rose substantially in the last several decades of the 20th century, Blacks and Hispanics are still underrepresented among medical school applicants, accounting for 7.4 and 7.1 percent, respectively, of allopathic medical school applicants in 2007, and 6.5 and 7 percent, respectively, of matriculants (Figure 2, next page). Combined, non-Asian minorities, including Blacks or African Americans, Hispanics or Latinos, American Indians and Alaska Natives, and Native Hawaiians and other Pacific Islanders, account for more than 25 percent of the U.S. population, but only 15.2 percent of the applicant pool for allopathic medical schools. The largest growth has been in the number of

Asian applicants and graduates. Asians, representing only about 3.5 percent of the U.S. population, accounted for 19.8 percent of all applicants and 50.8 percent of all racial and ethnic minority applicants to allopathic medical schools in 2007. The number of Asian graduates has grown about eightfold since 1982.⁹ Osteopathic schools reported similar numbers, with Black, Hispanic, and Asian applicants accounting for 6, 5, and 21 percent of the pool, respectively.¹⁰

Despite continuing and targeted efforts led by the AAMC and the AACOM to strengthen minority participation, the racial and ethnic diversity of non-Asian minorities enrolling in medical school has reached a relatively steady state in the last six years. Nevertheless,

FIGURE 2
Percentage and Number of U.S. Allopathic Medical School Applicants, by Race and Ethnicity, 2007



* Includes Cuban, Mexican American, Puerto Rican, Other Hispanic, and Multiple Hispanic.

Note: Categories are Non-Hispanic, with the exception of Hispanics or Latinos and Non-U.S. or Permanent Resident (Foreign). Individuals have the option of reporting both their race and ethnicity alone or in combination with some other race or ethnicity. In this figure numbers are reported for race alone; those that reported more than one race are included under Multiple Race.

Source: AAMC, Diversity in Medical Education: Facts and Figures 2008, (Washington, DC: AAMC, 2008); available at https://services.aamc.org/publications/showfile.cfm?file=version120.pdf&prd_id=239&prv_id=295&pdf_id=120.

the physician population is becoming more racially and ethnically diverse, as the increased numbers of minority medical school graduates move into practice.¹¹

UNDERSTANDING THE MEDICAL SCHOOL

There are 156 medical schools in the United States with a total active enrollment of approximately 76,070 students. Allopathic medical schools account for 131 of the schools; 25 of the schools are osteopathic medical schools. Average enrollment per school is approximately 500 students (125 per year), but entering class sizes vary from about 40 to over 250. Like many other graduate programs, medical school is expensive. Tuition, fees, and other expenses total \$30,000 to \$50,000 per year. The average debt of students who graduate from public medical schools exceeds \$120,000, while those graduating from private schools carry an average debt of \$160,000. Many graduates have debt in excess of \$200,000.¹²

Allopathic medical schools are what most people think of when they think of medical education. Osteopathic medical schools are somewhat different. These schools were founded on approaches to health and healing based in the physical manipulation of muscles and joints. Nevertheless, osteopathic schools have evolved to offer substantially the same curriculum as allopathic schools, with the addition of programming related to the principles of osteopathic spinal manipulation.¹³ The curricula are similar enough that the majority of osteopathic medical school graduates pursue residency training in allopathic residency programs. DOs currently account for about 6.5 percent of all physicians in the United States. New osteopathic schools have been opening at a higher rate than their allopathic counterparts since 1966; the percentage of all medical school graduates granted DO degrees has grown since then from 5 percent to almost 20 percent. If this trend continues, it is estimated that, by 2019, 25 percent of all U.S. medical school graduates will have DO degrees.¹⁴

Because of concerns in some quarters about a future shortage of physicians, the AAMC has called for an overall 30 percent increase in allopathic medical student enrollment by the year 2015.¹⁵ Many schools have increased and/or plan to increase their enrollments. In the past decade, five new allopathic schools have admitted students. Four of these schools matriculated their first classes in 2009. Six more have applied for accreditation. In the same time, six osteopathic schools

have opened and four others are planned.¹⁶ And many existing medical schools are opening branch campuses.

While a primary mission of medical schools is to educate doctors, medical schools also count among their missions the advancement of knowledge through basic, clinical, and health services research; the support and development of faculty as scholars, teachers, and clinicians; the care of patients; service to the larger university; and service to the community. Medical schools offer a variety of master's and doctoral degrees as well as joint degree programs in basic and applied sciences like biochemistry, cell biology, neurobiology and anatomy, microbiology and molecular genetics, pharmacology, toxicology, and medical informatics. They also educate other health professionals in allied health fields like physical therapy, imaging, epidemiology, physician assistant (PA), public health, and bioethics. Some medical schools enable students to earn a joint degree, the most common of which include the MD/PhD, MD/JD, MD/MPH, and MD/MBA.

The American Osteopathic Association (AOA) accredits osteopathic medical school programs. The Liaison Committee on Medical Education (LCME), established jointly by the American Medical Association (AMA) and the AAMC, accredits allopathic school programs.

MEDICAL EDUCATION

Like many other professional programs, medical education is extremely rigorous and demanding. As one recent study put it, "the purpose of medical education is to transmit the knowledge, impart the skills, and inculcate the values of the profession in an appropriately balanced and integrated manner."¹⁷ The student must acquire a large amount of scientific knowledge, and develop sophisticated analytic, diagnostic, and physical skills drawn from many disciplines. Understanding how best to accomplish this has occupied medical educators for over a century. The last decade has seen widespread attention to curriculum revision in medical schools.

Curricula

The medical school curriculum has traditionally consisted of a four-year course of study roughly divided into two years of science and two years of clinical training. The first two years have been devoted to intensive study of biomedical science. The basic science curriculum includes cell biology, genetics, biochemistry, physiology, embryology,

histology, reproduction, microbiology, pathology, anatomy, immunology, and pharmacology. These first two years often are augmented with “preceptorships” consisting of weekly or bi-weekly experiences in the offices of community physicians (often called “voluntary faculty” because they volunteer as preceptors) involved in one or more of the primary care specialties (for example, internal medicine, pediatrics, family medicine, or geriatrics). Preceptorships are designed to introduce students to real clinical practice and the array of both clinical and interpersonal skills needed to practice medicine.

The last two years of medical school have typically consisted of increasing immersion in clinical education. This occurs primarily at teaching hospitals affiliated with the medical school or its parent university and is where much of the medical school’s clinical faculty see patients. Students rotate through what are considered the core clinical specialties: internal medicine, surgery, obstetrics/gynecology, pediatrics, and psychiatry. Increasingly, rotations include fields such as radiology, neurology, family medicine, and emergency medicine. In the osteopathic curriculum, there are also courses and clinics in the theory and practice of osteopathic manipulative medicine. In the fourth year, students generally choose more intensive experiences in fields that are of greatest interest to them. These clinical experiences come with increasing responsibility for patient care and present opportunities for students to develop basic skills in patient and family interaction, the etiology of disease and the nature of disease processes, the art and science of diagnosis, and approaches to disease treatment and management.

Over the past decade, this traditional curriculum has been revised in many medical schools. Research by educators and cognitive scientists suggests that the traditional curriculum too rigidly separates science and clinical learning and that active learning is generally more effective than the passive lecture format. Many medical schools have revised their curricula to integrate clinical and basic science studies and to engage students in active learning. Now, it is not unusual for the first two years or more of the curriculum to be built around the cross-disciplinary study of organs and systems. These include pulmonary, cardiovascular, gastrointestinal, renal, endocrine, reproductive, and neurological systems, as well as bones, joints, and skin. Courses often feature small-group learning, with exercises and problem-solving organized around clinical cases. Case-based learning is designed to engage students to actively work together to seek

information and insight from various disciplines and to apply medical science to clinical practice. They also learn about normal versus abnormal functioning, and the manifestations of diseases. They are required to master the clinical reasoning process that is fundamental to the diagnosis and management of disease. Clinical rotations in years 3 and 4 cap off this course of study, just as they do with the more traditional curriculum.

Additionally, medical school curricula now often include courses on cultural competence, health law, ethics, complementary and alternative medicine, epidemiology, nutrition, genomics, patient safety and health care quality, nutrition, principles of public health, end-of-life care, and patient/family communication issues. In some schools, this material is integrated throughout the systems-focused course of training, rather than presented in separate courses. Some programs also require a scientific research experience or project. Schools widely employ online Web-based materials to support learning objectives. Modern information technologies, patient and organ simulators, robotics, and other technologies are also used.

Some medical schools have demonstrated that a fixed four-year curriculum may not be necessary. For more than 30 years, students at the Duke University School of Medicine have completed the required core curriculum of biomedical science courses and clinical rotations or clerkships in only two years. The third year is devoted to a major scholarly research project. The fourth year is devoted to electives. One U.S. medical school (Lake Erie College of Osteopathic Medicine) and two Canadian medical schools (Calgary and McMaster) offer three-year MD programs. A recent study of the Canadian schools suggests no significant differences in performance between their graduates and those graduating from four-year medical schools.¹⁸

ASSESSMENT AND LICENSURE

How to assess students' success in gaining knowledge and skills and in practicing the values of the medical profession has been the source of ongoing debate for over a century. During that period, educators have gained new knowledge about cognition and learning and the knowledge base, skills, and values of the profession have grown and evolved. Due to the emphasis on science-based learning in the post-Flexner era, medical students have been assessed with tests administered by each separate scientific discipline within the

medical curriculum. In the past, these examinations generally tested students' capacity for rote memorization of the basic science curriculum. Clinical knowledge and skills were evaluated by community physician preceptors and by medical residents in the teaching hospitals where students served their clinical rotations.¹⁹

In the 1950s, in response to ongoing issues in testing, the National Board of Medical Examiners established a standardized three-step examination designed to test students in basic sciences and clinical skills. The results of these examinations were soon adopted by most states as requirements for licensure. In 1992, these "medical boards" were revised and consolidated with another set of board testing that was devised to evaluate foreign medical students to form the United States Medical Licensing Examination (USMLE). Jointly sponsored by the Federation of State Medical Boards (FSMB), the USMLE examinations continue to structure testing and licensing (and therefore also teaching and learning) in medicine. The USMLE scores have also been adopted by residency program directors for ranking applicants to their programs. The current three-step USMLE examination process is under review and may soon be consolidated into two steps, taken in the fourth year of medical school and after the first year of residency. A similar three-step examination, the Comprehensive Osteopathic Medical Licensing Examination (COMLEX), is taken by osteopathic medical students and is sponsored by the National Board of Osteopathic Medical Examiners.

THE RESIDENCY MATCH

Upon completion of the first three to three and one-half years of medical school, students prepare to transition to the next stage of medical education: graduate medical education (GME), which is often referred to as the medical residency. Fourth-year medical students must decide what specialty they will choose for their residency and to which programs they will apply. It is not uncommon for students to travel on numerous occasions to visit and interview with residency programs in teaching hospitals. One former dean of medicine has called this travel-intensive period the "Marco Polo" year.²⁰ All of this exploration culminates a process known as "The Match."

The Match, conducted by the National Resident Matching Program (NRMP), literally matches students with residency programs. Students submit a list of residency programs in order of preference and

United States Medical Licensing Examination (USMLE)

Step 1

Taken at the end of the basic science curriculum in the second year of medical school.

Step 2

Taken in two parts during the fourth year of medical school; assesses whether students can apply clinical knowledge and clinical skills in supervised patient care.

Step 3

Taken at the end of the first year of residency (often referred to as the "internship" year); tests whether the physician is prepared for general unsupervised medical practice.

commit to accepting whatever program to which they are matched. The residency programs also submit a ranked list of the students that they would like to accept. The NRMP uses a process that matches students and residency programs according to the highest possible preferences. Graduating medical students find out whether and where they have been matched on “Match Day,” which is held in mid-March every year. Students who are not matched have an opportunity to pursue a position in programs with unmatched positions and/or can reapply for the match in subsequent years.

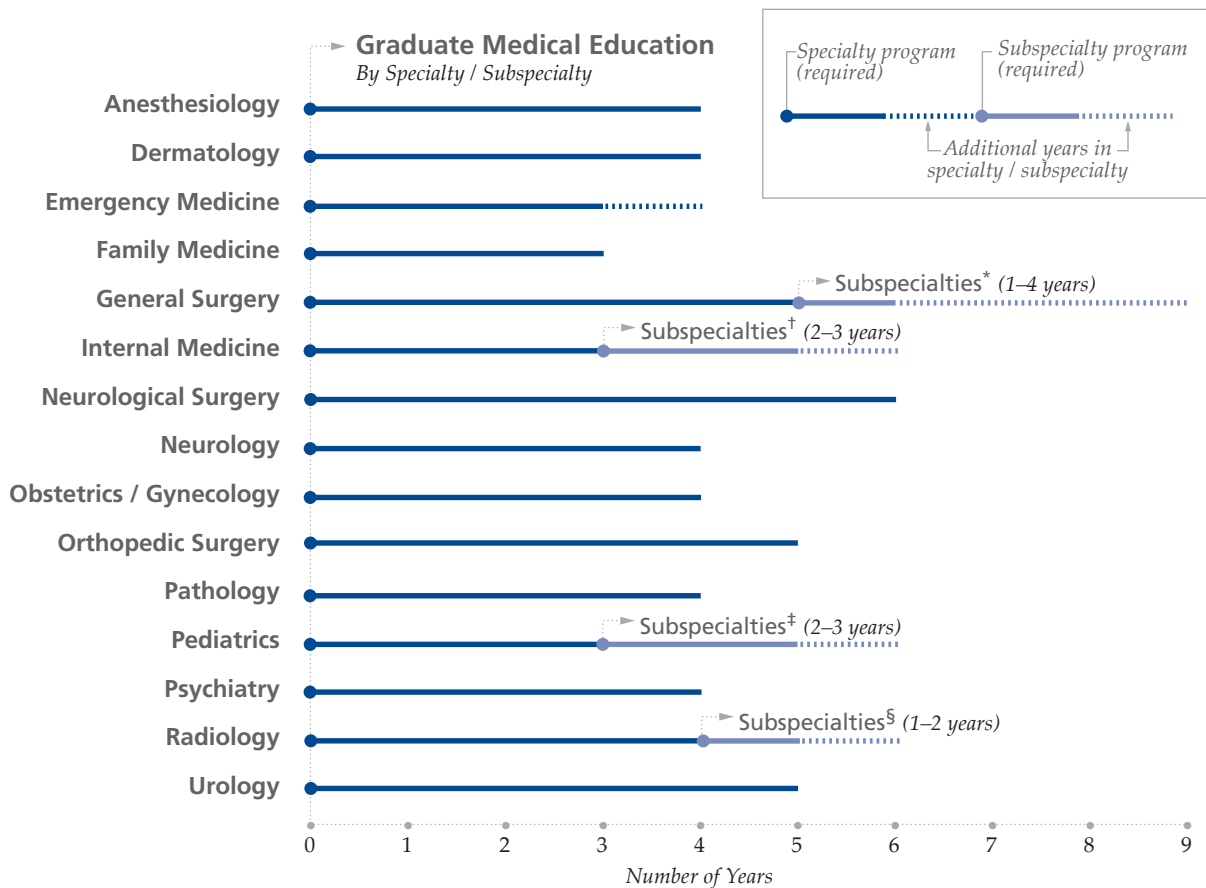
The match in 2009 included a total of 29,890 applicants for 22,427 first-year and 2,758 second-year positions. Approximately 95 percent of positions were filled. Applicants included 15,638 graduating U.S. allopathic medical school students and another 1,222 previous graduates (reapplying). In addition there were 7,484 non-U.S. citizen graduates of foreign medical schools and 3,390 U.S. citizen graduates of foreign medical schools, 2,013 graduates of osteopathic schools, and 35 Canadian medical school graduates.²¹ Because medical schools outside the United States and Canada have varying educational standards, curricula, and evaluation methods, those students and graduates applying to match from such medical schools must first be certified by the Educational Commission for Foreign Medical Graduates (ECFMG). Applicants must demonstrate that they are graduating from, or are graduates of, a medical school listed in the International Medical Education Directory (IMED), and they must pass the same USMLE exams as their counterparts in the United States and Canada.²² The IMED is maintained by the Foundation for Advancement of International Medical Education and Research, which was established in 2000 with a broad mandate to improve world health through education.²³ ECFMG certification is required of all foreign medical graduates for entry into Accreditation Council of Graduate Medical Education (ACGME)–accredited residency programs and for unrestricted licensure in all states.²⁴

GRADUATE MEDICAL EDUCATION

Once a person with an MD or DO degree who is matched starts a residency, he or she will spend a minimum of three years as a resident, usually in an accredited residency program of a teaching hospital (Figure 3, next page). The ACGME accredits all GME programs. Osteopathic postdoctoral training is accredited through the Council on Postdoctoral Training of the American Osteopathic Association.

Depending on the program, the first year of the residency can be structured as what is variously called a “transitional,” “internship,” “preliminary,” or postgraduate year one (PGY1) year of general training

FIGURE 3 Approximate Length of Select Graduate Medical Education Programs, by Specialty



* Additional 1 to 4 years after the residency. Subspecialties include Vascular Surgery, Cardio-Thoracic Surgery, Pediatric Surgery, and Colon and Rectal Surgery.

† Additional 2 to 3 years after the residency. Subspecialties include Cardiology, Endocrinology, Gastroenterology, Geriatrics, Hematology, Oncology, Infectious Diseases, Nephrology, Pulmonary, Rheumatology.

‡ Additional 2 to 3 years after the residency. Subspecialties include Pediatric Oncology, Pediatric Endocrinology, Pediatric Gastroenterology, Pediatric Infectious Diseases, Pediatric Pulmonology, Pediatric Rheumatology.

§ Additional 1 to 2 years after the residency. Subspecialties include Neuroradiology, Vascular and Interventional Radiology, Pediatric Radiology.

Note: Some of the specialties shown also have subspecialties that are not shown. For more detail on length of specialty and subspecialty training programs, see the current Graduate Medical Education Directory (the “Green Book”), published by the American Medical Association, and the Accreditation Council for Graduate Medical Education, Data Resource Book, 2008-2009, p. 30; available at https://www.acgme.org/acWebsite/dataBook/dat_index.asp.

Sources: Adapted from National Resident Matching Program, “Applicant User Guide,” August 2009, p. 9; available at www.nrmp.org/res_match/userguide/2010_applicant.pdf; and “Length of Residencies in Various Specialties,” Washington University, available at <http://residency.wustl.edu/medadmin/resweb.nsf/0ee53e934810efcd86256a94005e5f7d/3edd4e91945f8a2b86256f850071ae49?OpenDocument>.

before the resident moves on to more specialized training. Each medical and surgical specialty's Residency Review Committee develops the standards for the specialty's GME training. Osteopathic postdoctoral training is accredited through the Council on Postdoctoral Training of the American Osteopathic Association. Many residents pursue further subspecialty training within their chosen field in a fellowship that will take an additional one to five years, depending on the specialty.

The conduct and course of a residency varies with each specialty. But common to all residencies is the focus on what are known as the "six core competencies," adopted by the ACGME in 1999, outlining what residency programs must require their residents to learn (see text box). First-year residents start with the basics of patient histories and physical exams, and they shadow senior residents on rounds. They learn to admit patients and perform simple procedures; attend regular seminars on relevant topics and discuss individual patient

ACGME General Competencies Minimum Program Requirements Language

Approved by the ACGME, September 28, 1999

Educational Program — The residency program must require its residents to obtain competencies in the six areas below to the level expected of a new practitioner. Toward this end, programs must define the specific knowledge, skills, and attitudes required and provide educational experiences as needed in order for their residents to demonstrate:

Patient Care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health

Medical Knowledge about established and evolving biomedical, clinical, and cognate (that is, epidemiological and social-behavioral) sciences and the application of this knowledge to patient care

Practice-Based Learning and Improvement that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care

Interpersonal and Communication Skills that result in effective information exchange and teaming with patients, their families, and other health professionals

Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population

Systems-Based Practice, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value

Source: Accreditation Council of Graduate Medical Education (ACGME), "General Competencies"; available at www.acgme.org/outcome/comp/compMin.asp.

diagnoses, treatment decisions, behaviors, and competency issues with other residents and with supervising physicians; and learn to work with nurses, pharmacists, and other health professionals.

As they advance in their training, residents are given greater responsibility and less direct oversight. Each program attempts to balance independence and oversight of residents. Too much latitude given to the resident trainee can lead to harm of the patient. Too little responsibility given to the resident can lead to an under-prepared physician.

Attending to the full course of a patient's illness, from initial presentation to resolution, is considered to be invaluable to training. But this learning imperative can mean 30 or 40 hours of consecutive duty, in 100- or 120-hour work weeks, with little time for rest or sleep—for months or years at a time. Evidence suggests there is a serious physical and emotional toll on the sleep-deprived and stressed resident, and subsequent risk to patients. The ACGME in 2003 adopted guidelines providing for limitations on resident work hours. These include limiting duty hours to an 80-hour work week and numerous other provisions designed to ensure adequate rest, sleep, and time for research and reflection, as well as family and other personal priorities.²⁵ Resident work hours and conditions continue to be important topics in education policy.²⁶

By the end of residency training, physicians are supposed to be prepared to practice medicine in their chosen specialty. If they choose to sub-specialize, they may apply for a fellowship, which will provide additional training in the subspecialty area.

OBTAINING AND MAINTAINING THE MEDICAL LICENSE

In order to practice clinical medicine, a physician must obtain a state medical license. Each state and U.S. territory has its own standards. Almost all jurisdictions permit licensure after only one year of residency. All states, but not all U.S. territories, require certain minimum performance on the USMLE, and most have limits on the number of attempts and time within which to pass Step 3 of the USMLE. The FSMB recommends allowing no more than six attempts within seven years. The first-time pass rate for U.S. and Canadian MDs in 2008 was 94 percent and for DOs was 90 percent. Non-U.S. and Canadian examinees had a first-time pass rate of 78 percent.²⁷ State licensing

authorities also typically require recommendations from residency programs attesting both to the physician's competence and character, and most conduct criminal and other background checks.

Once a physician is licensed, all states assume that the physician continues to be competent to practice absent evidence to the contrary. Therefore, maintaining and renewing the medical license is mostly a fee-based administrative function, though, in some jurisdictions, licensing boards ask for information about hospital privileges, specialty certifications, malpractice cases, and any disciplinary actions related to the physician's practice of medicine. Most state boards require physicians to attest to having obtained a specified number of continuing medical education (CME) credits, though few require such credits to relate directly to the physician's scope of practice.²⁸ The FSMB is engaged in an effort to introduce and encourage the adoption of competency standards for state maintenance of licensure, but has not yet been successful.

BOARD CERTIFICATION AND MAINTENANCE OF CERTIFICATION

Physicians who have successfully completed an accredited residency program may choose to take an examination to become a "board certified" physician. Board certification is an honorary and meritorious designation that attests to a high level of professional knowledge and skill. More than 90 percent of licensed physicians in the United States are board certified. The American Board of Medical Specialties (ABMS) consists of 24 member boards responsible for certification in each of the 24 medical specialties and 145 subspecialties.²⁹ The 24 ABMS member boards adopted maintenance of certification (MOC) requirements in 2000. The ABMS MOC is designed to structure continuous and ongoing measurement of physicians in the six core competencies based on a four-step process meant to be completed over a period of years specified by the particular specialty. Each specialty is customizing its own version of the four-step MOC processes (see text box, next page), while an overall effort continues to define basic ABMS MOC standards.³⁰

The drive to adopt board certification and maintenance of certification as a universal professional standard in medicine has been decades in the making and remains a work in progress. The ABMS

A Four-Part Process for Continuous Learning

While ABMS guides the maintenance of certification (MOC) process, ABMS' 24 member boards set the criteria and curriculum for each specialty. The four-part MOC process includes:

Part I	Professional Standing	Medical specialists must hold a valid, unrestricted medical license in at least one state or jurisdiction in the United States, its territories, or Canada.
Part II	Lifelong Learning and Self-Assessment	Physicians participate in educational and self-assessment programs that meet specialty-specific standards that are set by their member board.
Part III	Cognitive Expertise	Specialists demonstrate, through formalized examination, that they have the fundamental, practice-related and practice environment-related knowledge to provide quality care in their specialty.
Part IV	Practice Performance Assessment	Specialists are evaluated in their clinical practice according to specialty-specific standards for patient care. They are asked to demonstrate that they can assess the quality of care they provide in comparison to peers and national benchmarks and then apply the best evidence or consensus recommendations to improve that care using follow-up assessments.

Source: American Board of Medical Specialties (ABMS), "MOC Competencies and Criteria"; available at www.abms.org/Maintenance_of_Certification/MOC_competencies.aspx.

launched a "2008–2011 Public Trust Initiative" to further encourage the implementation of this professional commitment among its 24 member boards.³¹

CONTINUING MEDICAL EDUCATION

Over the last two decades, CME has come to be considered critical to a physician's ongoing professional competency and to keeping up with advances in medicine and health care delivery. Yet CME is not regulated in the same way that the other phases of medical education are regulated. The Accreditation Council for Continuing Medical Education (ACCME) directly, or through state medical societies, accredits more than 2,500 U.S.-based organizations to provide CME through a voluntary system of reporting and review. But neither the ACCME nor any other independent body regulates or accredits the actual content of CME programming. Therefore, the educational content and effectiveness of CME is the subject of continuing debate and reform efforts.

CME has not only come to be seen by most medical and professional associations as a professional responsibility, it is also required for maintaining licensure, for relicensure, and for a variety of other important purposes. Sixty-one state and U.S. territory licensing boards (both allopathic and osteopathic) now have mandatory CME requirements for relicensure. The AMA has played an important role in promoting CME among physicians through its Physician's Recognition Award (PRA). Forty-eight states and territories accept an AMA PRA certificate or an AMA-approved PRA application as documentation of meeting their CME requirements.³² Many medical specialty societies, ABMS specialty boards, hospitals, the Joint Commission (the main hospital accrediting body), insurance groups, and others require evidence of CME credits. As a result, CME is offered in a wide variety of venues, and the AMA's PRA Category 1 credits are the main currency of CME legitimacy and participation.

Nevertheless, studies have suggested that too much of CME is of poor quality and of little educational value.³³ Much CME is sponsored by pharmaceutical and medical device companies, where the content can be seen as self-serving rather than objective or comparative. Medical schools and other accredited educational institutions tend to have little control over either CME content or pedagogical approaches.³⁴ A physician may choose programs of CME that provide new, important, and educationally robust learning experiences. But as the IOM recently reported, the quality and utility of much CME remains highly suspect.³⁵

ENDNOTES

1. A. Flexner, *Medical education in the United States and Canada: A report to the Carnegie Foundation for the Advancement of Teaching* (New York: Carnegie Foundation for the Advancement of Teaching, 1910).
2. J. Duffy, *From Humors to Medical Science: A History of American Medicine*, 2nd ed. (Urbana and Chicago: University of Illinois Press, 1993).
3. Duffy, *From Humors to Medical Science*.
4. Michael E. Whitcomb and Donald Nutter, "Learning Medicine in the 21st Century: The Education of Medical Students, The General Professional Education of the Physician," The Carnegie Foundation for the Advancement of Teaching, 2002, p. 15; available at www.carnegiefoundation.org/sites/default/files/Learning_Medicine.pdf.
5. Association of American Medical Colleges (AAMC), "Medical College Admission Test (MCAT)"; available at www.aamc.org/students/mcat/start.htm.

6. American Association of Colleges of Osteopathic Medicine (AACOM), "2009 Osteopathic Medical School Applicants – A profile," September 1, 2009; available at www.aacom.org/about/fastfacts/Pages/default.aspx.
7. AAMC, "U.S. Medical School Applicants and Students 1982-83 to 2009-10," data chart, 2009; available at <http://aamc.org/data/facts/start.htm>.
8. AAMC, "U.S. Medical School Applicants."
9. AAMC, *Diversity in Medical Education: Facts & Figures 2008* (Washington, DC: AAMC, 2008); available at https://services.aamc.org/publications/showfile.cfm?file=version120.pdf&prd_id=239&prv_id=295&pdf_id=120.
10. AAMC, *Diversity in Medical Education*.
11. AAMC, *Diversity in Medical Education*.
12. AAMC, "Medical School Tuition and Young Physician Indebtedness (An Update to the 2004 Report)," October 2007; available at https://services.aamc.org/publications/index.cfm?fuseaction=Product.displayForm&prd_id=212&prv_id=256.
13. AACOM, "What Is Osteopathic Medicine?" available at www.aacom.org/about/osteomed/Pages/default.aspx.
14. Norman Gevitz, "The Transformation of Osteopathic Medical Education," *Academic Medicine*, 84, vol. 6 (2009): pp. 701–706; available with subscription at http://journals.lww.com/academicmedicine/Abstract/2009/06000/The_Transformation_of_Osteopathic_Medical.13.aspx.
15. AAMC Executive Council, "AAMC Statement on the Physician Workforce," June 2006; available at www.aamc.org/workforce/workforceposition.pdf.
16. Stephen C. Shannon, "Osteopathic Medicine & Medical Education and Health Care Reform," presentation to the 98th Annual Convention of the Maine Osteopathic Association, Samoset Resort, Rockport, Maine, June 14, 2009; available at www.aacom.org/resources/other/Pages/default.aspx.
17. Molly Cooke *et al.*, "American Medical Education 100 Years after the Flexner Report," *New England Journal of Medicine*, 355, no. 13 (September 28, 2006): p. 1341.
18. Jocelyn M. Lockyer *et al.*, "An Analysis of Long-Term Outcomes of the Impact of Curriculum: A Comparison of the Three- and Four-Year Medical School Curricula," *Academic Medicine*, 84, no. 10 (October 2009): pp. 1342–1347; available with subscription at http://journals.lww.com/academicmedicine/Abstract/2009/10000/An_Analysis_of_Long_Term_Outcomes_of_the_Impact_of.14.aspx.
19. Kenneth M. Ludmerer, "The Forgotten Medical Student," ch. 11 in *Time to Heal: American Medical Education from the Turn of the Century to the Era of Managed Care*, (New York: Oxford Univ. Press, 1999), pp. 196–218.
20. M.M.E. Johns, "Transforming Medical Education in the 21st Century," remarks delivered to the American Medical Association Council on Graduate Medical Education and Section on Medical Schools, Chicago, June 17, 2005.
21. National Residency Matching Program (NRMP), "Results and Data: 2009 Main Residency Match," April 2009, available at www.nrmp.org/data/resultsanddata2009.pdf.

22. Educational Commission for Foreign Medical Graduates (ECFMG), "ECFMG Certification Fact Sheet," updated August 27, 2009; available online: www.ecfm.org/cert/certfact.html.
23. Foundation for Advancement of International Medical Education and Research (FAIMER), "Who We Are," updated January 25, 2010; available at www.faimer.org/who.html.
24. ECFMG, "ECFMG Certification Fact Sheet."
25. ACGME, "ACGME Duty Hours Standards Fact Sheet"; available at www.acgme.org/acWebsite/newsRoom/newsRm_dutyHours.asp.
26. Institute of Medicine (IOM), Board on Health Care Service, *Resident Duty Hours: Enhancing Sleep, Supervision, and Safety* (Washington, DC: National Academies Press, 2008); available at www.iom.edu/Reports/2008/Resident-Duty-Hours-Enhancing-Sleep-Supervision-and-Safety.aspx.
27. United States Medical Licensing Examination (USMLE), "2008 USMLE Performance Data"; available at www.usmle.org/Scores_Transcripts/performance/2008.html.
28. Federation of State Medical Boards (FSMB), "Maintenance of Licensure," draft report of Special Committee on Maintenance of Licensure, February 4, 2008; available at www.fsmb.org/m_mol.html.
29. American Board of Medical Specialties (ABMS), "Study Profiles Effective Doctor-Patient Communication," press release, June 11, 2007; available at www.abms.org/News_and_Events/news_archive/release_ABMS_Study_06_07.aspx.
30. ABMS, "ABMS Maintenance of Certification"; available at www.abms.org/Maintenance_of_Certification/ABMS_MOC.aspx.
31. ABMS, "ABMS Maintenance of Certification."
32. American Medical Association, "Continuing Medical Education"; available at www.ama-assn.org/ama/pub/education-careers/continuing-medical-education.shtml.
33. Dave Davis *et al.*, "Impact of Formal Continuing Medical Education: Do Conferences, Workshops, Rounds, and Other Traditional Continuing Education Activities Change Physician Behavior or Health Care Outcomes?" *Journal of the American Medical Association*, 282, no. 9 (September 1, 1999): pp. 867–874; available with subscription at <http://jama.ama-assn.org/cgi/content/abstract/282/9/867>.
34. Michael E. Whitcomb, "CME Reform: An Imperative for Improving the Quality of Medical Care," *Academic Medicine*, 77, no. 10 (October 2002): pp. 943–944; available with subscription at http://journals.lww.com/academicmedicine/Fulltext/2002/10000/CME_Reform__An_Imperative_for_Improving_the.1.aspx
35. IOM, Committee on Planning a Continuing Health Professional Education Institute, *Redesigning Continuing Education in the Health Professions*, (Washington, DC: National Academies Press, December 2009); available at www.nap.edu/catalog/12704.html.