

## Chapter 2

# Graduate Medical Education and Career Paths

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In order for a graduate of an international medical school to work as a licensed physician in the United States, he or she must obtain graduate-level medical education—residency—in the United States and obtain appropriate licensure. This chapter explains what this education is, the necessary prerequisites, and the process for obtaining it. Because entrance into medical programs is competitive, this chapter also discusses techniques that can help international medical graduate (IMG) physicians be successful in getting accepted and offers suggestions for success during and post residency.

### What Is Graduate Medical Education?

The term *Graduate Medical Education* (GME) describes postgraduate medical training in the United States, which is typically either hospital-sponsored or hospital-based training pursued after graduation from medical school. GME includes internship and residency and leads to state licensure and board certification. It can also include subspecialty programs and fellowship programs. The quality of GME programs and the training they provide is evaluated by an organization called the

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Accreditation Council for Graduate Medical Education (ACGME). The requirements for entering an ACGME-accredited GME program are the following:

1. To have a recognized medical degree from an accredited medical school,
2. To have passed the United States Medical Licensing Examination (USMLE), and
3. For graduates from international medical schools, to have obtained certification from the Educational Commission for Foreign Medical Graduates (ECFMG).

These requirements are discussed further below.

## **Medical Degree from an Accredited Medical School**

Medical schools in the United States go through a rigorous peer review process to ensure the quality of the education that they provide to medical students. This process ensures that all medical graduates exhibit appropriate professional competencies. For schools providing medical degrees (MD), the Liaison Committee on Medical Education (LCME) is the organization that provides the accreditation. For medical schools leading to osteopathic degrees (DO), the organization that currently provides accreditation is the American Osteopathic Association's Commission on Osteopathic College Accreditation.

Medical schools in different countries have varying curricula and evaluation methods. The ECFMG verifies the medical training that international graduates receive. Foreign medical schools that are recognized by the appropriate agency in their country are listed in the International Medical Education Directory (IMED) (Table 2.1).

## **The USMLE**

All US medical students take the USMLE, which is a requirement for obtaining a medical degree from a US medical school accredited by the LCME. International medical students must also take the USMLE exams. The exams consist of three different sections, called steps. The USMLE Step 1 is designed to assess a candidate's understanding and ability to apply basic science principles. Step 2 has two parts. Step 2 Clinical Knowledge (CK) focuses on the application of medical knowledge for patient care. Step 2 Clinical Skills (CS) uses standardized patients to evaluate the ability of the candidate to take a patient history, perform physical examinations, and communicate with patients. Step 3 is the final examination in the USMLE series that is required to get a license as a practicing physician. Not all programs require that a candidate take this step before applying for a GME position. All residents are, however, required to take and pass this examination before they are promoted to their third year of residency.

**Table 2.1** Helpful organizations

Organization	Website
Association of American Medical Colleges (AAMC)	<a href="https://www.aamc.org/">https://www.aamc.org/</a>
Accreditation Council for Graduate Medical Education (ACGME)	<a href="https://www.acgme.org">https://www.acgme.org</a>
American Medical Association-International Medical Graduates Section (AMA-IMG Section)	<a href="http://www.ama-assn.org/go/img-mock-interview">http://www.ama-assn.org/go/img-mock-interview</a>
Educational Commission for Foreign Medical Graduates (ECFMG)	<a href="http://www.ecfm.org/">http://www.ecfm.org/</a>
ECFMG Certificate Holders Office (ECHO)	<a href="http://www.ecfm.org/echo/resources.html">http://www.ecfm.org/echo/resources.html</a>
Electronic Residency Application Service (ERAS)	<a href="https://www.aamc.org/students/medstudents/eras/international/">https://www.aamc.org/students/medstudents/eras/international/</a>
Fellowship and Residency Electronic Interactive Database (FREIDA)	<a href="https://www.ama-assn.org/go/freida">https://www.ama-assn.org/go/freida</a>
International Medical Education Directory (IMED)	<a href="https://imed.faimer.org/">https://imed.faimer.org/</a>
National Residency Matching Program (NRMP)	<a href="http://www.nrmp.org/">http://www.nrmp.org/</a>
United States Medical Licensing Examination (USMLE)	<a href="http://www.usmle.org/">http://www.usmle.org/</a>

## ECFMG Certification

The ECFMG was founded to assess and confirm that international applicants are ready to enter GME programs in the United States. The ECFMG also facilitates the entry of IMG physicians into GME programs by serving as a proxy for their foreign medical schools and, occasionally, by sponsoring necessary visas for international physicians to enter GME programs.

ECFMG certification is a requirement for IMG physicians who want to enter a training program accredited by the ACGME. To obtain ECFMG certification, IMG physicians must complete the following steps:

1. Submit the initial application,
2. Meet the USMLE requirements, and
3. Have a medical school diploma.

Once the application is submitted, the ECFMG supplies the applicant with an identification number, which is needed to take the USMLE.

The ECFMG application consists of questions that confirm the applicant's identity and his or her enrollment in and graduation from an accredited foreign medical school that is listed in the IMED. A medical school diploma is not needed to start the process of applying for certification, but it is a requirement before certification is issued.

IMG physicians must supply copies of all relevant academic records and documents to the ECFMG. The ECFMG then verifies these documents directly with the medical school. After an IMG physician receives certification from the ECFMG, the ECFMG serves as the dean's office for records for the international applicant.

Out of all IMG physicians who started the examination process with the ECFMG over a 20-year period, only 57 % ultimately achieved certification [1]. The ECFMG has developed resources to assist its certified IMG physicians through its ECFMG Certificate Holders Office (ECHO) (see Table 2.1).

## **Obtaining a GME Position**

The process of applying for GME is expensive and involves multiple organizations. Graduates from LCME-accredited medical schools in the United States (USMGs) can start this process during the fourth year of medical school and thus join a residency program right after graduating. Because IMG physicians need to obtain ECFMG certification, they usually have a gap period between graduating from medical school and starting residency. The process for admission into a GME program consists of four steps:

1. Selecting residency programs.
2. Applying to residency programs and interviewing with them.
3. Matching with a program.
4. Having necessary legal status to be in the United States and join the residency program.

## **Selecting Residency Programs**

Prior to applying for residency training, medical graduates need to select one or more medical specialties. USMGs are guided in this decision-making process through their medical school. IMG physicians might not receive such counseling during their training, so it can be useful to speak with physicians practicing in medical specialties of one's choice. It is also important to research the number of positions available, the degree of competitiveness experienced in obtaining a residency position, and the experience of other IMG physicians. The best way to get basic information on a residency program is by exploring the Fellowship and Residency Electronic Interactive Database (FREIDA), which is maintained by the American Medical Association (see Table 2.1). FREIDA Online is a database with over 9500 GME programs, which can be used by interested students to find programs by specialty and by region and which also provides details about programs' size and salary, among other factors. After compiling a list of potential programs, it is important that students visit each program's website to obtain more specific information.

Individual program websites might have additional requirements listed. Program websites usually also have more information about the program's clinical sites, rotations, and curriculum.

## Applying to GME Programs

The first step in the application process is to become familiar with the Electronic Residency Application Service (ERAS) (see Table 2.1). The ERAS was developed by the Association of American Medical Colleges (AAMC) to simplify the application process for GME. ERAS serves as a common application pathway to multiple programs and transmits applications, USMLE transcripts, Medical Student Performance Evaluations (MSPE), medical school transcripts, letters of recommendation, personal statements, and other supporting credentials from applicants and their designated dean's office to program directors. For IMG physicians, the ECFMG serves as the designated dean's office. All applicants need a token number to register for MyERAS. IMG physicians receive their token number from the ECFMG, and US medical students obtain it from their medical school. The ERAS website has useful tools like the ERAS User Guide, the ERAS Worksheet, and the IMG Residency Applicant Checklist (see Table 2.1).

The personal statement is a very important part of the application, but many IMG physicians may not have previous experience in this genre of writing. Personal statements are usually very carefully read by selection committees, because the statement is the only part of the application that is not based on test scores or on other people's evaluation of the applicant. The personal statement is an opportunity for applicants to talk about why they are interested in a particular specialty and to show their passion and commitment (for an example of a personal statement, see Box 2.1). ECHO has a resources section with a detailed list of what to do and what to avoid for personal statements (see Table 2.1).

Aspiring physicians can start working on their applications on the MyERAS website in July (see Table 2.2 for the timeline of application steps). They can start submitting their applications to various programs in September. The applications then become available to programs to download and review. Programs contact applicants directly to invite them for an interview. This process can be time-consuming and expensive because it involves traveling to the program sites. Most programs have a full day of interviewing. Some programs offer dinner the day before the interviews, which is usually optional. Though some parts of the interviewing process may be informal, such as lunch with residents, the applicants should consider all aspects of their interaction with the program as part of the interviewing process.

Most programs finish interviewing by the end of January. Residency program interviews are a critical part of the selection process and should be treated just as seriously as job interviews. There are many useful tips and advice on how to

**Box 2.1 Example of a Personal Statement****Personal statement****Peter Smart, MD**

I was born and raised in Rio de Janeiro, Brazil. My father is an MD/PhD from São Paulo University who specializes in diabetes, my mother is a nurse and his assistant, and my 3-year older brother is a theater stage director. Because our family home also serves as my parents' office, I was exposed early in my life to the rewards and difficulties of practicing medicine. The medical profession fascinated me because it requires the command of an extensive range of analytical and interpersonal skills.

After high school, I decided to move to London, England, to pursue medical studies. As a second-year medical student, I had my first encounter with psychology and peer counseling when, after completing a basic training course, I worked at the on-campus counseling center. I believe that this experience marked a turning point in my life because I consciously put aside my own ideas and actively listened in order to provide someone else the space to tell her or his own story. I was inspired by the difference this apparently simple process made in the lives of the peers I counseled. Furthermore, I enjoyed tutoring (and being tutored), studying abroad, and playing the piano in duets and small groups. At the same time, I worked on animal models of pharmacological studies under the guidance of Dr. Lukas Smarter, who mentored me in publishing my results in scientific journals and presenting my findings at national conferences. Conceptual thinking, analytical skills, problem-solving, patience, and a lot of hard work came together in original research—an exciting combination that I hope will drive my future as a physician-investigator.

Although I had originally decided to stay in London for my residency, I ultimately elected to move to the US because of the wide variety of research opportunities in US universities; my interest in international perspectives of health care delivery systems; and the family networks I have in the US, which have been providing me with extraordinary support, both personally and professionally.

I moved to Newark, New Jersey, in August 2014 and started working as a research assistant with Dr. Eugenia Smartest in an adult inpatient ward that is primarily devoted to the care of patients with schizophrenia. Inspired by the competence and compassion of my attending physician, the challenges of making psychiatric diagnoses and planning treatments, and my enjoyment of talking with people who have mental illness, I delved into studying psychiatric textbooks and articles. During my first month in Newark, my team admitted a 26-year-old woman in acute and severe exacerbation of her chronic schizophrenia. She had not responded to several antipsychotic medications and was started on clozapine with guarded optimism. I followed the patient very closely for a month, evaluated her improving level of organization, and observed her gradual “return to reality.” On the day of her discharge, 6 weeks later, she thanked me and shared with me her future plans to return to college; at that point I decided to become a psychiatrist. Subsequent work in other fields remained interesting to me; however, I was continually drawn back to my overriding fascination with psychiatry because it is the only specialty that treats simultaneously the body and the mind. In my experience in medicine, I have yet to witness a physical disorder that does not have psychological repercussions and often vice versa.

For the next 4 years, as a resident in psychiatry, I am looking forward to immersing myself in the study of psychopharmacology and psychotherapy and emerging with the potential to become an outstanding clinician, a pioneer researcher, and an effective instructor. Looking into the future, I aspire to a career in academic psychiatry that will bring together my abilities, interests, and ideals.

**Table 2.2** Sample application timeline

Date	Application step
July 1	MyERAS website opens for applicants
September 15	Applicants can begin applying to programs Residency programs start receiving applications
September 15	Registration for “The Match” opens
October 1	MSPEs are released to residency programs
October-January	Programs invite applicants for interview
January 15	Rank order lists (ROLs) can be started by all
February 25	Deadline for certifying ROLs
March 16	Match Week Applicants find out if they have matched Program Directors find out if they have filled all positions Supplemental Offer and Acceptance Program (SOAP) begins
March 20	Match day results released
July 1	First day of residency!

Please note dates vary every year. Please check final dates for the particular application year

prepare for interviews online. Some organizations, such as the American Medical Association-International Medical Graduates Section (AMA-IMG Section), have also created a mock interview program that applicants can use for practice (see Table 2.1).

**Matching with a GME Program**

The National Resident Matching Program (NRMP) is the official organization that provides both applicants and residency training directors a standardized way of selecting their choices. Applicants need to register with the NRMP starting in September. After finishing their interviews, applicants make a list of training programs in order of their preference. Program directors do the same for their preferred applicants. These lists are called rank order lists (ROLs) and usually need to be submitted to the NRMP by the middle of February. The NRMP then uses a computerized algorithm to match applicants with programs, hence the commonly used term *the match*. During the third week of March, applicants are informed if they have matched with a program, and program directors are notified if they have filled all their positions. This match is followed immediately by a secondary match called the Supplemental Offer and Acceptance Program (SOAP).

## Having Legal Status

Each applicant must be legally authorized to stay in the United States and attend GME. For physicians who are foreign nationals, obtaining the appropriate visa that permits training in a GME program is another essential requirement. The most common visas include J-1 and H-1 [2]. J-1 visas for physicians in clinical training are sponsored by the ECFMG. H-1 visas have to be sponsored by training programs. Because only some programs will sponsor H-1 visas, IMG physicians need to review individual program websites. According to the GME census in 2012, 13 % of all IMG physicians held H-1 visas and associated categories, and 17 % of IMGs held J-1 visas and associated categories. Almost 50 % of all IMGs in 2012 were either native/naturalized US citizens or permanent residents [3].

## The Odds and How to Improve Your Chances

The number of USMGs has been increasing rapidly in the last few years, and there is a rising concern that soon these graduates will outpace the available GME positions [4] and that the match rate for IMG physicians will be adversely impacted, thus increasingly limiting the entry of IMG physicians in GME. International applicants can get match data every year from the NRMP and ECFMG websites. Data provided for IMG physicians are subdivided into US citizen IMGs (USIMGs) and non-US citizen IMGs (non-USIMGs). In 2014, 51 % of all IMG physicians who participated successfully matched to a program [5].

In addition to annual data, a longitudinal study examined the outcomes for all IMG physicians who obtained ECFMG certification in 2005–2006 [6]. This study examined the success rates of these graduates through the 2008–2009 residency application cycle, thus providing useful information about the eventual success of IMG physicians in obtaining a residency position. Roughly, 50 % of this cohort failed to match in their first attempt, but 76 % had begun their residency training by 2010. These numbers differ substantially for USIMGs and non-USIMGs. Ninety-one percent of USIMGs and 73 % of non-USIMGs were successful in obtaining residency positions during the time period studied. Even though the researchers concluded that the majority of IMG physicians who persist in applying for a GME spot will eventually get one, they also found that the success rate declines with each passing year.

The ECFMG also provides information on the variables associated with the match for IMG physicians [7]. In the match year 2013, 50 % of IMGs matched, with a 53 % match rate for USIMGs and 48 % for non-USIMGs. The top ten match specialties for IMG physicians in 2013 were internal medicine, family medicine, pediatrics (categorical), psychiatry (categorical), surgery (preliminary), medicine (preliminary), pathology, obstetrics-gynecology, neurology, and surgery (categorical). When a majority of programs offer residency positions in which trainees would complete all their required residency training, these positions are categorical. Some



programs also offer positions that provide only 1 or 2 years of training and are known as preliminary positions. It is possible to enter some specialties (e.g., psychiatry, neurology, urology) as a second-year postgraduate after completing a preliminary year.

IMG physicians can find information such as the average number of programs to which IMG physicians applied, the number of specialties to which IMG physicians applied, and the number of interviews IMG physicians had from the ECFMG. Most of these variables did not differ among IMG physicians who matched versus those who did not. Approximately 22 % of those surveyed reported matching to an institution where they had previous clinical experience. According to the respondents to this survey, the most effective ways to obtain clinical experience in the United States were by directly contacting a teaching hospital, making personal contacts, and working through their original medical schools.

The ECFMG and NRMP also provide a detailed analysis of match success rates [8] and define success as matching to the preferred specialty only. The 2013 report found that IMG physicians who were successful in matching were more likely to have ranked more programs in their preferred specialty. They had higher USMLE scores and spoke English as a native language. Also, they had graduated medical school and obtained ECFMG certification closer to the timing of the match. Overall, USIMGs were more successful in obtaining a residency position in their specialty of choice than non-USIMGs (48 % vs. 44 % in 2013). Despite the importance of these data, there are some drawbacks. The success rate has been defined as the specialty of choice; according to NRMP match data from 2014 [5], only half of the international applicants who matched had matched to their first ranked specialty. Also, these data did not include variables like personal statements, letters of recommendation, and interviews. According to a study that looked at predictors of IMG physicians matching to ophthalmology residencies, the most important predictor was having three letters of recommendation from US ophthalmologists [9]. The other factors were higher USMLE Step 1 scores, academic awards, high-impact journal articles, and research experience in the United States.

## Success in Residency

Although success in residency involves many factors, such as staying healthy both physically and mentally, this section focuses solely on optimizing residency from a professional perspective. Professional success during training relies on excelling in two main tasks: all required components of the residency—in other words, meeting and exceeding the faculty's expectations on rotations, on-call duties, and other educational obligations—and in an area (or two) above and beyond residency requirements. What is needed to achieve the first task is fairly well delineated by the ACGME and each program's residency mandates. The second task is more complex. Excelling in an "extracurricular" activity during the busy residency years is a tall order, especially when many residents are already struggling to balance

residency with family obligations, to address financial stressors, to perfect language skills, and to negotiate ongoing acculturation dynamics. Five extra hours a week devoted to the pursuit of one's passion, however, will likely prove to be a great investment for a very successful and gratifying career.

Engaging in research, teaching, writing, presenting, advocacy, and leadership activities are some of the major avenues that residents take to achieve such excellence. No matter what a resident decides to pursue, having mentors during training greatly facilitates and propels one's career path to excellence.

## **Research**

Most residents gain research experience by joining an ongoing project in their department. Although this is a productive and straightforward way to enrich one's training, the 3 or more years of residency also afford the motivated and enthusiastic resident an opportunity to initiate an individual research project.

Under the supervision of a mentor, a resident can develop a study, collect data, analyze results, and publish findings within the psychiatric residency timeframe. The successful completion of a truly resident-driven and resident-owned project, from beginning to end, speaks volumes to future employers in terms of the resident's intelligence, drive, analytical and language skills, and patience.

## **Teaching**

In recent years, education has been moving away from large, lecture room didactics and toward more interactive, small group teaching modalities. This shift in adult learning has resulted in a significant need for teachers, group facilitators, teaching assistants, and seminar leaders.

Medical school and undergraduate curricula directors are typically delighted to engage a resident in teaching a course (or part of a course). Medical trainees not only have technical expertise in a variety of biomedical and psychosocial subjects, but also possess effective interpersonal and communication skills, all of which are essential components of great teaching.

Apart from medical school and college, resident physicians may find other ways to teach depending on the resources—and, more appropriately, the needs—of a particular community. Such opportunities may be found in a number of settings, including high schools; jails; lesbian, gay, bisexual, and transgender youth centers; retirement homes; churches; mosques; and synagogues. Evening classes that promote healthier living on topics such as parenting, sex, exercise, nutrition, domestic violence, stress, substance use, depression, and HIV/AIDS are often greatly welcome.

## Writing

Intelligence, medical knowledge, hard work, and perhaps most importantly, a knack for playing well with others are all vital ingredients for success in medicine. Beyond these skills, future professional partners are also thrilled to work with physicians who are able to write well.

Publishing original research studies in scientific journals is an excellent way to demonstrate writing proficiency, but it is not the only option. A letter to the editor of a local or national newspaper, an op-ed essay on a current controversy, an ongoing blog on the Internet, or an expert medical opinion (in a question-and-answer format, for example) for a popular website are all examples of medical writing that show thoughtfulness, language skills, and willingness to share one's knowledge with the general public.

## Presenting

Presenting at a conference alongside a faculty member is one of the most rewarding—and, yes, perhaps nerve-racking—experiences for a resident. Similarly to getting started in research, the most direct route toward presenting at a meeting is to identify a mentor and assist in his or her project. For example, a resident may search the literature and deliver the opening presentation of a symposium before the faculty members elaborate on the main topic.

Alternatively, a resident may decide to develop his or her own presentation, or chair a workshop or symposium, and ask a faculty member to be the discussant or senior advisor for the project. Involvement in national organizations, such as the AMA, greatly facilitates this process (see the “Advocacy and Leadership” section).

## Advocacy and Leadership

Physicians do much more than treat patients; they are expected to also advocate for them, educate the public about health and illness, and assume leadership roles in society [10]. Although residency does not directly prepare doctors for advocacy and leadership, the time during training is optimal for starting this process.

The majority of medical organizations are committed to the promotion of the next generation of physicians and thus offer many special programs to members-in-training. Although many residents join the professional group of their specialty, few take advantage of the ample opportunities for advocacy and leadership that such organizations offer. For example, the American Psychiatric Association

(APA) encourages residents to join its governance, where trainees meet with peers and mentors and make important decisions about the future of psychiatry. APA district branches routinely support a wide variety of resident functions, from movie nights to National Alliance on Mental Illness (NAMI) walks. Numerous fellowships provide formal mentorship and financial assistance for participation in meetings and conferences. Getting actively involved with a professional organization solidifies a resident's professional identity as a physician, patient advocate, and leader.

## **Mentors and Anti-mentors**

Finding a mentor during residency may be easier than most residents fear. Faculty members who have chosen to stay in academia often do so because they like working with medical students and trainees, and they welcome the opportunity to mentor. "All you have to do is ask" may be a cliché, but it is not an exaggeration. Residents should seek a physician in the university, hospital, or clinic who inspires them and who seems like the doctor they would like to someday become. A resident should then ask to help him or her with a research, teaching, administrative, or clinical project. If the resident and physician get along well during the process of working together, then the resident has found a mentor.

Finding mentors is key to residents' professional development, but identifying anti-mentors is equally important. Residents should be wary of physicians who behave like someone they would never want to become. Residents should think about what makes these physicians less than ideal and strive to avoid duplicating their habits, techniques, and demeanor. The flaws of anti-mentors may teach residents as much as their mentors.

## **Career Paths After GME**

Many different paths are open to IMG physicians after they complete GME. They can choose clinical, academic, and/or research paths. IMG physicians are well represented in all aspects of medicine in the United States. Out of all active physicians in the United States, 24 % are IMG physicians [11]. Similar to USMGs, most IMG physicians are involved in direct patient care. Their contributions in teaching, research, and leadership are also visible at the national level. Many IMG physicians have been recognized at national levels for activities like improving health care delivery, introducing new surgical techniques, making significant discoveries in biomedical research, and developing innovative teaching methods [12].

## Patient Care

IMG physicians live and practice in all parts of the United States. The top five states in which they practice are New Jersey, New York, Florida, Illinois, and Michigan [11]. Certain areas in the United States have a higher representation of IMG physicians from specific countries of origin. For example, IMG physicians from Central and South American countries live in large numbers in Florida. IMG physicians from Pacific Asian countries have a higher representation in California, and a large number of IMG physicians from Israel and Europe live in New York. IMG physicians from India are more evenly distributed across the United States than those from other countries [13]. IMG physicians also tend to be located in higher numbers in major metropolitan areas.

Some people believe that IMG physicians play a “gap-filling role,” entering specialties that USMGs do not prefer [14]. As mentioned earlier, the top five specialties favored by IMG physicians for training are internal medicine, family practice, pediatrics, surgery (general), and psychiatry. IMG physicians, especially those on temporary visas, subspecialize at a greater rate than USMGs [15]. This phenomenon can be explained in part by the absence of debt from college loans that most IMG physicians have. In some specialties, like geriatric medicine, almost 50 % of all active physicians are IMG physicians. Other specialties in which they constitute greater than 30 % of active physicians are nephrology, neonatal-perinatal medicine, internal medicine, pulmonary disease and critical care, endocrinology, hematology and oncology, pathology, psychiatry and neurology [11]. A cardiology workforce group reported that IMG physicians represent 25 % of all cardiologists and 40 % of all cardiology trainees in the United States. They expressed concern that any decline in IMG physicians staying and training in the United States will adversely impact the cardiology workforce. This workforce group’s recommendations included suggestions for creating a “short track” training program for IMG physicians with significant previous experience in cardiology [16].

Overall, IMG physicians are more likely than USMGs to practice a primary care specialty. IMGs represent 24 % of all physicians in primary care [17]. According to a study that compared patient and physician characteristics in office-based clinical settings, one-fourth of all outpatient visits were to IMG physicians. One-fourth of all office-based physicians were international graduates. IMG physicians served a more diverse ethnic patient population and were more ethnically diverse themselves in comparison to USMGs [18]. Also, IMG physicians carry a relatively greater burden of service to the poor and needy in rural areas of the United States than USMGs [19, 20].

Because different countries have varying curricula and evaluation methods, some researchers have studied whether clinical outcomes vary depending on whether a physician trained in a medical school in the United States, Canada, or elsewhere [21]. This study examined a large number of inpatient records to evaluate patient outcomes when IMGs or USMGs provided care. They found no difference in patient mortality rates, but when they subdivided IMGs into USIMGs and non-USIMGs, they found that non-USIMGs had significantly lower patient mortality rates than both USMGs and USIMGs.

## Research and Teaching

According to a study that examined the contributions of IMG physicians to US medical schools and to research, IMG physicians constitute 13 % of full-time faculty in US medical schools and 24 % of full-time physician faculty [22]. IMG physicians constitute approximately one-fourth of all full-time faculty physicians who are principal investigators on National Institutes of Health (NIH) research grants. This study estimated that in the basic science department, the ratio of full-time physician faculty is 2:1 for IMG versus USMG faculty. The authors note that IMGs have maintained an important presence as medical school faculty and, over the years, have shown growth in their presence as principal investigators. In fact, some authors have promoted IMG physicians as an overlooked source of physician-scientists [23].

Another paper focusing on the role of IMGs as teachers notes that the key issue for IMG physicians is often confidence and exposure, not ability; IMG physicians can develop into outstanding teachers [24].

## Roads Less Traveled

Despite the many successes of IMG physicians, funded research and administrative and organizational leadership are areas for growth. As mentioned earlier, IMG physicians have been and can be very successful as educators, researchers, and leaders. Despite their potential, many IMG physicians do not try for these positions, however. In part, this is due to lack of exposure to non-clinical roles during residency training. Because IMG physicians tend to train more in community-based programs, they often do not get the same exposure to teaching and research. Despite these barriers, it has been estimated that nearly 11 % of all department chairs in US medical schools are IMG physicians [12]. A recent AMA report looked at the demographics of its leadership and found that both women physicians and IMG physicians were underrepresented in leadership roles [25]. However, there are increasing numbers of successful role models for IMG physicians in organized medicine. For example, a recent president of the American Psychiatric Association was an IMG physician.

The sky really is the limit for IMG physicians in the United States, and this is borne out by their success across all aspects of medicine.

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