Working Paper

October 2003 #83

International Medical Graduates in the United States: A Review of the Literature 1995 to 2003

by

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WWAMI CENTER FOR HEALTH WORKFORCE STUDIES

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The WWAMI Center for Health Workforce Studies is supported by the Bureau of Health Professions' National Center for Health Workforce Information and Analysis. Grant No. 1U76-MB-10006-03; $250,000; 100%.

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This research was funded by the National Center for Health Workforce Analysis, Bureau of Health Professions, Health Resources and Services Administration, through contract number 6U79HP00003-04-01 to the University of Washington Center for Health Workforce Studies.

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Introduction

International medical graduates (IMGs) are physicians who practice medicine in a country other than where they attended medical school. In the United States, IMGs constitute approximately 25 percent of the nation's physician workforce. In 2001, the countries contributing the largest numbers of foreign nationals were India, the Philippines, Mexico, Pakistan and China. However, one should note that approximately 10 percent of all IMGs are U.S.-born. Graduates of Canadian medical schools are not considered to be IMGs in most research on the subject, because medical schools in both countries are accredited by the Liaison Committee on Medical Education (LCME). The LCME is sponsored by the Association of American Medical Colleges (AAMC) and the American Medical Association (AMA).

The motivation for this review of the literature is several-fold. The authors and our research colleagues are investigators in the Center for Health Workforce Studies at the University of Washington, where we have undertaken a number of projects related to IMG practice in the United States. This literature review constitutes a deliverable product for our primary funding agency, the Bureau of Health Professions in the Department of Health and Human Services' Health Resources and Services Administration. It was also conducted, however, to educate ourselves about the history of IMGs in the United States and about the breadth and depth of research that came before us in the investigation of IMGs.

IMGs have played a contentious role in U.S. health workforce policy. The debate about IMGs rests primarily on the question of whether the United States has a physician excess or deficit, whether they offer the same quality of medical care as U.S. graduates, and whether IMGs fill relative shortages in specialties and/or locations.

Debate also arises about three other points, but less frequently. First, some argue that IMGs displace training and employment opportunities for U.S. citizens. Second, the fact that the United States relies quite significantly on foreign-national doctors raises concerns about international equity, given that most of the country's IMGs come from low-income countries with much more drastic health care shortages (Hallock et al., 2003). Finally, the clinical competency of IMGs is periodically questioned.

Physicians first migrated to the United States in significant numbers just prior to World War II. There are many avenues and mechanisms by which foreign nationals come to the United States to practice medicine, and some of these have changed over time.

Since the late 1940s, many foreign-national physicians come to the United States on exchange visitor (J-1) visas to pursue graduate medical education (GME). The U.S. State

Department requires that J-1 visa holders return to their country of origin for two years following the completion of GME. However, this home return requirement can be waived if the J-1 visa holder agrees to work in an underserved location for three to five years under the aegis of several government agencies or a state department of health. In addition, some foreign-national IMGs who practice in a primary care specialty in an underserved area may become eligible for permanent residency.

The rich policy debate about IMGs has generated a large body of published literature. Mick and Pfahler (1995) prepared a synthesis of the literature on IMGs from 1980 to 1994 at the request of the U.S. Health Resources and Services Administration. This extensive review provided an excellent overview of the history of IMGs in the United States and what was known at the time about their overall supply, distribution and competence. It concluded with several comments about the likely future role of IMGs in U.S. medicine.

In the following chapters, we synthesize the literature discussing IMGs that has appeared from 1995 on. This literature falls into seven main areas:

(1) The overall U.S. supply of physicians.
(2) Profiles of IMGs.
(3) The IMG "pipeline."
(4) Graduate medical education.
(5) The distribution and gap-filling roles of IMGs.
(6) IMG quality.
(7) Legal issues.

We drew the literature primarily from a Medline search of the keywords "foreign medical graduate." We also searched LegalTrac, Expanded Academic Index, and Proquest Research Library Complete for the terms "foreign medical graduate," "international medical graduate," "foreign physician," and "IMG." Finally, we searched the Web for unpublished reports, again using the terms listed above. The literature review that follows synthesizes the articles and reports in the appended bibliography, but we also include a reading list of other literature pertaining to this topic that isn't specifically reviewed in this document.

Chapter 1 provides background information about the supply of physicians in the United States. It emphasizes that the United States faces both a surplus and maldistribution of physicians. This situation affects the perceived role of IMGs in the United States in various ways.

Chapter 2 describes IMG demographics and characteristics, including countries of origin, settlement patterns in the United States, and demographic and specialty information.

Chapter 3 discusses the pipeline channels of IMGs to the United States. It discusses those factors that attract IMGs to the United States ("pull factors") and those that drive them away from their countries of origin ("push factors"). It also discusses the legal mechanisms by which IMGs come to the U.S.

Chapter 4 discusses U.S. graduate medical education and its role in attracting and dispersing IMGs.

Chapter 5 examines the role of IMGs in the U.S. health care safety net, specifically how IMGs are distributed to rural and underserved areas.

Chapter 6 considers the debate about the quality of IMGs in the United States. It divides studies and their conclusions into those that emphasize structure, process and outcome.

Researchers have produced a significant amount of new material on IMGs since the Mick and Pfahler 1995 review. The events of September 11, 2001, have had a significant effect on migration to the United States generally. As well, a decline in interest in primary care has exacerbated the need for service to rural and underserved communities, potentially generating increased demand for IMGs. New measures of IMG competence have also been introduced in recent years (i.e., the United States Medical Licensing Examination [USMLE], a clinical skills exam sponsored by the Federation of State Medical Boards).

Despite the plethora of IMG research between 1995 and 2002, we recommend several areas for future research.

(1) Globalization of trade (particularly through mechanisms like the North American Free Trade Agreement [NAFTA] and the World Trade Organization [WTO]) are decreasing barriers to licensure for foreign-trained physicians, particularly those from Mexico. The international standardization of medical education curriculum has created a new climate for skills migration around the planet.

(2) IMGs face immigration restrictions and discrimination in a more significant way than before September 11, 2001, and the current political administration, especially for those from Middle Eastern countries.

(3) The Conrad 30 program as of now lacks sustained analysis of ramifications such as longevity of IMGs placed in underserved communities.

(4) An area ripe for investigation is the motivation behind, and ramifications of, large numbers of U.S. citizens training at foreign medical schools and then returning to the United States.

(5) The implications of the loss of skilled professionals from poor countries who migrate in a steady stream to rich countries have received little attention in the health policy literature. This comes at a time of emerging infections and

growing concern about epidemics of AIDS, TB, malaria and other infectious diseases.

(6) Additionally, we have heard little about the point of view of IMGs themselves.

Chapter 1: Supply and Distribution of Physicians

The context of physician supply and distribution in the United States influences and shapes IMG policy. U.S. policy pertaining to physician training and placement rests on a fairly general consensus there is an oversupply (as measured by need, if not demand) but a maldistribution of physicians across the country. The United States has almost 800,000 doctors. This number translates into a ratio of 279 physicians per 100,000 population, one of the highest in the world (AMA, 2002).

Despite the large numbers of physicians per capita in the United States, Mullan's (2002) observation that "white follows green" (doctors locate in relatively wealthier communities) has been repeatedly demonstrated with regard to physician distribution, leaving inner city and rural areas with shortages of physician care.

Over time, the primary focus of policy goals has alternated between reducing the oversupply of physicians and correcting their geographic maldistribution. The simultaneous oversupply and maldistribution persists because the United States, in contrast to other developed countries, leaves physician supply decisions (number of medical schools, number of residencies) largely to the market, while public subsidies (public medical school subsidies, residency position funding) support the market's decisions.

Some commentators have recently suggested the country should increase the production of U.S.-trained physicians. The rationale for this new opinion comes from two observations. First, the market has an insatiable appetite for medical care, even in the absence of rational public health goals (Cooper et al., 2002). Second, IMGs comprise one-fourth of our practicing physicians and an even larger portion of inner-city house staff in several key states. For example, 55 percent of house staff in New Jersey and 40 percent in New York originate from overseas (Jaklevic, 1997).

Market and Nonmarket Influences on Physician Supply and Distribution

Policy and market-driven influences on physician supply and distribution occur at various points in the physician production pipeline. However, the amount by which the supply of physicians increases or decreases hinges largely on the number placed in graduate medical education (GME) or residency training programs each year. GME programs are the required training programs for practically all specialties, financed almost entirely by the federal Medicare program and Medicaid programs, jointly funded by state and federal sources. The number of residency positions increased by 19 percent between 1989 and 1993

(from 80,935 to 96,469) (Stimmel, 1996). There are approximately 25,000 residency positions per year, a number significantly greater than the 16,590 MDs who graduate from the 127 U.S. medical schools each year. About 5,000 residents are IMGs.

Over the past four decades, federal support of GME programs produced rising numbers of physicians. Physician to population ratios were 115 per 100,000 in 1965, and rose to 200 by 1990. Physician numbers increased 28 percent between 1980 (467,679 physicians) and 1990 (601,060 physicians) (Mick, 1993). This increase occurred not because medical schools produced more graduates, but because teaching hospitals increased the size of their GME programs. They did this because house staff provide a relatively inexpensive way to deliver medical care to the poor people served in many of these facilities, and because—until the 1997 Balanced Budget Act (BBA)—Medicare was willing to pay all the costs for these house staff. Once residents finished their programs, they became part of the overall (maldistributed) physician population, but there were more residents in line behind them. Nationally, one-quarter were IMGs, but they comprised a much higher percentage in some states and hospitals.

The BBA marked the first step away from the "blank check" for GME. The Act attempted to cap the number of residents at 1996 levels and reduce the continually escalating increase in indirect medical education payments.

Cooper et al. (2002) point out that health expenditures as a portion of gross domestic product (GDP) will reach 18 percent by 2020 if they continue to grow by 1.5 to 2 percent per year. Cooper draws a causal relationship between economic expansion and growth of physician supply. Moreover, he claims, we should factor in population expansion and the reduction in effort by aging and female physicians, suggesting that the United States will continue to require more physicians that it can train itself. There has been a doubling of per capita physician supply since 1929. Current trends should translate into a need for almost 900,000 doctors by 2010 (283 per 100,000 population) and more thereafter.

Grumbach (2002) provides a counterpoint to Cooper et al.'s projections. Grumbach notes that our reliance on the market to drive physician supply has resulted in idiosyncratic and irrational results. He reviews the history of physician supply policy in the United States, noting that government did not have much involvement in medical care before 1910. At that time, 160 medical schools enrolled 25,000 students; we had a doctor to population ratio of 175:100,000; and physicians made modest incomes and patients incurred their own costs. After the Flexner report (1910), government involved itself in credentialing and training quality issues. Thereafter, the number of physicians per 100,000 persons decreased to 125 and their incomes increased. The maldistribution of physicians began to be noticed. Consequently, between the 1960s and 1990 government supported much more of the cost of medical training and care. In addition, it created the National Health Service Corps (NHSC)

in the 1970s. GME expenditures rose to $9 billion a year (Greene, 1999). Policy makers and interest groups discovered that increasing supply can co-exist with rising incomes, and that government will spend money on medical education without regulating the supply of physicians.

In 1980, the Graduate Medical Education National Advisory Committee (GMENAC) advocated a needs-based workforce policy, projecting a surplus of 145,000 physicians by 2000. The Reagan administration paid little attention to this projection in the 1980s. Nonetheless, no new medical school expansions took place after that time. Per Grumbach (2002), the Fourth Council on Graduate Medical Education (COGME) report followed, proposing an ideal of 60 to 80 generalists and 80 to 100 specialists per 100,000 population, and capping GME positions at 110 percent of annual aggregate medical school graduates (no more than 19,000 first year residents). Congress financed the creation of departments of family medicine during that decade.

Almost 20 years after the GMENAC report cautioned about a physician surplus, the 1997 BBA cut GME funding by $7 billion through 2003 (Greene, 1999). The BBA included no specific policy promoting primary care GME, and family practice declined after 1997. Several medical interest groups (such as the AMA) are promoting an "all payer" GME financing pool such as the one the Clinton health reform plan would have adopted, rather than leaving all the financing of GME to Medicare and Medicaid. Academic medical centers object, however, citing the unreliability of such a pool. The Association of American Medical Colleges (AAMC) and AMA in 1996 called for a stop to Medicare funding of residencies filled with IMGs. The General Accounting Office (GAO) in 1996 issued a report critical of J-1 visa waiver programs (Jaklevic, 1997).

Despite repeated calls for limiting the number of physicians produced in the United States, there have been no limits on GME expansion until the 1997 BBA (and even those were subsequently softened). Grumbach (2002) says if we want a market-driven system, we should ask the market to pay for GME without government subsidy. Mullan (1997) recommends awarding hospitals a specified number of GME slots with $100,000 per year of NHSC funding, and loan repayment supports of $35,000 per resident per year. With savings from reducing GME financing for IMGs (26,000 of them), we could afford this.

After the failure of the Clinton Health Security Act, and the market flirtation with managed care, some thought a decline in physician incomes would lead to a reduction in their numbers. Some specialties even saw a decline for a very short period, but there has been no actual decline in physician numbers or their average salaries. However, specialists now total 72 percent (Greene, 1999), after growing by 3.1 percent annually between 1987 and 1993 (Sullivan et al., 1996). In 2000, Grumbach (2002) says we find physicians have "won," and we are back to more specialization, higher incomes, more supply and higher prices.

Reinhardt (2002) responds to Grumbach that supply-side controls without financing reforms (manipulation of the demand side) are doomed to result in perceptions of physician shortage. He argues that our current system wastes care on the rich at the expense of the poor. He questions how workforce planning alone will take care of those patients currently left out of the system when physicians are not obliged to treat them. According to Reinhardt, perhaps medical education should be viewed as a publicly-financed investment in human capital that produces quasi-civil servants with explicit social obligations.

Meanwhile, the Canadians followed a very different path. The Hall Commission in 1964 recommended joint federal-provincial funding for health plans. Canada adopted the single-payer Medicare system in 1966 for all citizens. The 1980 Hall commission recommended reducing the number of medical students, which was done (by 10%). The 1984 Canada Health Act made provinces the sole funders of medical care, and a 1991 act (Barer-Stoddart) coordinated workforce management efforts among provinces. Provinces now limit medical school enrollments, restrict the number of billing numbers issued, and cap physician payment levels. In Canada, IMGs comprised 24 percent of the physician workforce in 1970. This number rose to 30 percent by 1976 and has since leveled off.

The Role of International Medical Graduates in National Physician Supply

In the past, the focus of U.S. policy regarding physician numbers or distribution has influenced how it treated IMGs. When policy makers become concerned about physician surpluses, they have sought to restrict the training and immigration of IMGs. The AAMC opposed the Pew Foundation's recommendation to close medical schools to achieve a 20 to 25 percent reduction in medical school enrollment by 2005, and instead recommended a reduction in GME slots going to IMGs. Forty-five foreign graduates go into residencies for every 100 American graduates (Greenberg, 1996). Since residents are so inexpensive, eliminating many of those positions would cause the total cost of care to increase, although unequal pay for equal work based on citizenship is a "pernicious concept," according to Stimmel (1996). He recommended a consortium of teaching hospitals that would be charged with downsizing positions to between 110 percent and 120 percent. IMGs have more trouble finding positions when they finish their training than do U.S. medical graduates (USMGs): one survey showed 14.2 percent of IMGs were unemployed immediately after residency, compared to 4.8 percent of USMGs (Miller et al., 1998).

Kindig and Libby (1996) projected physician production numbers required to reach the various physician to population ratios advocated in the literature (175 to 248 per 100,000 population; higher ratios assume more specialists). At current rates, we will reach a ratio of 253 per 100,000 by 2020. This assumes 25,000 GME graduates per year, 35 percent

generalists, with the United States capturing 77 percent of the IMGs in GME; currently we lose 28 percent back to home countries. We would have to reduce between 226 (high) and 1,742 slots (low) per year for five years to achieve these target ratios. Kindig recommends any advocates for changing class sizes should specify the ratio targets desired. For example, to reach the middle or low ratios, we would have to eliminate all IMGs in GME and go below U.S. medical school graduation class sizes. The class size policy, therefore, can't be made independently of the IMG policy.

Cooper et al. (2002) propose that steadily increasing demand for physicians requires more than 25 new medical schools in the next decade—a need that could be met in the meantime (or instead) by increased IMG recruitment. Mullan (2000), on the other hand, concludes that we should offer more medical school seats to U.S. students and reduce the number of IMGs who train to remain in the United States.

The ramifications of policies that favor or discourage IMGs, which usually exist side-by-side, constitute an important theme in the following chapters.

Chapter 2: IMG Profiles

The most comprehensive and thorough piece in the IMG literature reviewing the cycles of IMG research, the numbers of IMGs coming to the United States and their origins, the reasons IMGs come here, and the kind of medicine they practice, is a paper delivered by Stephen Mick to the international conference on medical workforce in San Francisco in 1999 (Mick et al., 1999). Mick points out that while the number of IMGs has been steadily increasing for 50 years, there is a "seasonal" aspect to the research and policy literature addressing IMG issues. The literature tends to go in 10-year cycles, with little spurts of activity followed by a decade of little attention to the issue.

The growth of IMGs showed a steady increase until the early 1970s, then dipped and leveled off through the 1980s, but rebounded again during the 1990s. One can attribute the increase through the mid-1990s mostly to hosting more residents on exchange visas. IMGs residents—who each year typically numbered between 69,000 and 75,000—increased at an annual rate of 16.7 percent between 1988 and 1996, leveling off recently.

IMGs usually refer to foreign-national physicians trained outside of the United States who come to this country for GME training, and frequently stay to work. There are several variations on this theme, each of which is discussed in greater detail below.

- The foreign national non-U.S. citizen who attends medical school abroad, then comes to the United States.
- The Canadian citizen physician who is treated differently than other foreign nationals.
- The U.S. citizen who attends medical school abroad, but then returns to the United States.
- Foreign nationals who attend U.S. medical school branch campuses abroad.

Sources and Characteristics of IMGs

Country of Origin

According to Mick et al.'s (1999) analysis of 1998 AMA Masterfile data, the greatest number of IMGs came from India (19.7%), Philippines (10.6%), then Mexico, Pakistan, the Dominican Republic, South Korea, Italy, Spain, Iran, the former Soviet Union, Egypt, Grenada, Syria and Cuba. Miller et al. (1998) noted that over 1,000 post-resident physicians in the United States attended New Zealand and Australian medical schools.

Specialty Practice

Mick et al. (1999) found that IMGs display a stronger tendency than USMGs to select a primary care specialty. Among IMGs, 40 percent work in primary care, compared to 32.7 percent of USMGs and 29.7 percent of Canadian MGs. Half of IMGs (55.2%) specialize in internal medicine, family practice, pediatrics, psychiatry, and anesthesiology, compared to 39.1 percent of USMGs and 43.5 percent of Canadians. IMGs constitute 39.9 percent of internists, 37.9 percent of family practitioners, 33.8 percent of pediatricians, 32.8 percent of psychiatrists, 32.1 percent of obstetrician/gynecologists, 32 percent of anesthesiologists, 30.3 percent of general surgeons and 30 percent of radiologists.

Geographic Distribution

IMGs exhibit marked differences in distribution across states. The states that attract the majority of IMGs include New York, California, Florida, New Jersey and Illinois. Sixty-five percent of IMGs locate in the most urban of counties, compared to 55 percent of USMGs. Equal numbers of IMGs and USMGs work in the least populated counties.

Correlates of Distribution: Ethnicity

Following predictable associations between ethnic background, nationality and language, Mexican physicians are more likely to come to Texas, Dominican Republic doctors go to Florida, South Koreans go to California, Italians to New York and New Jersey, Spaniards to Florida, Iranians to California, citizens of the former USSR to New York, and Syrians to Michigan and Ohio. Big cities also tend to draw some specific ethnic groups.

Major Professional Activity and Present Employment

IMGs are more likely than USMGs to be employed in hospitals, and less likely to be in teaching or administration, and less likely to be in medical schools, the U.S. public health service, or the armed services. They are more likely to be in solo practice than in group practices. More IMGs work in public institutions: city, county, and state hospitals, public health care organizations and the Veterans Health Administration.

Gender

Differences in the specialty distribution of IMGs are in part a function of gender. Mick et al.'s (1999) analysis found female IMGs are in slightly greater proportion than female USMGs, though Canadian women comprise a smaller proportion than either group. The proportion of female IMGs in primary care is 44.4 percent, compared to male IMGs at 32.6 percent (male USMGs are at 28.6%, women at 40.9%).

Age

IMGs tend to be older than USMGs; 46.8 percent of IMGs were 50 or older in 1998, compared to 34.8 percent of USMGs. This is not the case for some specific countries of origin.

U.S. Citizens Who Attend Medical School Abroad

There are medical schools that train physicians not for their own domestic health services, but for the intended benefit of other countries. The Latin American Medical School in Cuba is one of these. Eaton (2001) reports that the school (based at the site of a former naval academy) offers seats to eight U.S. students. The school offers a six-year curriculum to high school graduates. It eventually hopes to offer 500 scholarships per year to American students (250 of them black) who are from poor communities. Five thousand students from 24 American and African nations now attend. U.S. citizens who go to offshore medical schools have typically come from New York, New Jersey and Connecticut (Mick et al., 1999).

Chapter 3: Pipeline for IMGs

IMGs come to the United States for a variety of reasons, which migration theory classifies as "push" and "pull' factors. Educational benefits, pay differentials and conditions of practice are attractors. Various laws and logistics may either attract or deter IMGs. Living and working conditions at home may be difficult. The combination and interaction of these factors influence whether IMGs come to the United States, and whether they stay.

IMG immigration began in the 1930s when Jewish physicians fled European countries, and was boosted after WWII with the establishment of the exchange-visitor visa ("J," or student visa) via the 1948 Smith-Mundt Act. U.S. hospitals welcomed the physician labor with open arms, despite the explicit language in the bill that the J-visa category was not intended to help hospitals meet staffing needs. While IMG permanent visas declined (from 72.4% to 42.3%) from the mid-1980s to the mid-1990s, the number of IMGs on exchange visitor visas increased (from 22.3% to 39.6%).

The 1965 Immigration Act had the effect of increasing the number of physicians immigrating for residency programs and favoring Asian country immigrants. In 1996, 27 percent of post-resident IMGs were trained in South Asian Countries (including India and Pakistan), 22 percent in Latin America, 18 percent in Pacific Rim countries (including the Philippines), 16 percent in Europe, 9 percent in the Middle East and 2.8 percent in Africa.

History

The Educational Commission for Foreign Medical Graduates (ECFMG) formed in 1956 to validate educational credentials and ensure that IMGs were prepared to undertake residency training. The State Department officially recognized the role of this organization in performing these functions. ECFMG's testing mechanisms have evolved over the years, and the commission gives the tests in 40 sites in the United States and 117 abroad. The U.S. Medical Licensing Exam (USMLE) is now taken by both IMGs and USMGs.

Starting in the mid 1970s, concerns about a severe surplus of physicians by 1990 led to a series of proposals to reduce new IMG resident slots (Mick & Pfahler, 1995). Not only were those proposals unsuccessful, the numbers of IMGs actually increased since then. The focus of regulations pertaining to IMGs since then, however, has been to encourage their practice in underserved areas of the United States. Immigration policy in general is now tempered by strong concerns about threats to national security. Nonetheless, policy towards physician immigration remains strongly favorable, with the exception that those from Middle Eastern countries face the same special registration requirements of their fellow nationals. A

report in *The Lancet* (Greenberg, 2002) indicates that high-level U.S. officials are fully aware about the possible consequences of a decline in IMGs to a wide variety of academic science programs. For example, foreign students pay $11 billion in tuition and fill the science and engineering programs that USMGs don't seek. President Bush's science adviser, John Marburger, was quoted as saying: "A catastrophic loss of technical capability would ensue."

Much of the immigration policy aimed at skilled professionals, especially physicians, is described in a working paper published by the University of Washington's WWAM Center for Health Workforce Studies (Johnson et al., 2003) and is summarized below.

Examination Requirements

In order to enter into the United States to pursue GME, the IMG must have a medical degree and become certified by the Educational Commission for Foreign Medical Graduates (ECFMG).[1] To become certified, the applicant must (1) present evidence of a final medical diploma granted by a medical school listed in the *International Medical Education Directory* of the Foundation for Advancement of International Medical Education and Research, completing at least four academic years; (2) pass the U.S. Medical Licensing Examination (USMLE) Step 1 (basic science) and Step 2 (clinical science),[2] offered at ECFMG examination centers throughout the world; (3) obtain a satisfactory score on the ECFMG English test; and (4) pass the ECFMG Clinical Skills Assessment (CSA).[3] The CSA consists of 10 encounters between candidates and specially trained patients (usually actors) to assess skills in medical history taking, physical examination, interpersonal skills and spoken English proficiency. A passing score on the CSA became an ECFMG certification requirement on July 1, 1998 (Whelan et al., 2002).

Once the IMG has passed all of steps listed above, he or she is granted a Standard ECFMG Certificate and may apply to any residency program accredited by the Accreditation Council for Graduate Medical Education (ACGME). Upon entering an accredited U.S. graduate medical education program, IMGs become eligible for permanent validation of the ECFMG Certification.

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[1] The examination is waived for IMGs who will be engaged in teaching or research that does not involve patient care, who are of national or international renown in their field of medicine, or who were licensed and practicing medicine in the United States before January 9, 1978.

[2] The National Board of Medical Examiners (NBME) examination, the former Visa Qualifying Exam (VQE), the former Federation Licensing Examination (FLEX) and the Foreign Medical Examination in the Medical Sciences (FMGEMS) count as equivalents for the purposes of ECFMG certification. Medical students may sit for Step 1 after two years of medical school and take Step 2 if they are within 12 months of completion of the full didactic curriculum.

[3] Passing grades on the USMLE Step 1 and the TOEFL are prerequisites for taking the CSA.

Licensing Requirements

Licensing requirements differ little between USMGs and IMGs, except that IMGs must hold ECFMG certification (described above). GME applicants need to apply for and obtain provisional state licensure concurrent to the residency application. The USMLE Step 3, which ascertains whether a physician is suitably qualified to practice medicine unsupervised, is a prerequisite for full licensing. The examination is administered by each state through its state licensing authority. Examination requirements vary by state; some permit IMGs to take the exam before any graduate training in a U.S. or Canadian hospital, while others require up to three years of training. However, all states require at least one year of U.S. or Canadian training for licensure. In order to sit for the USMLE Step 3, IMGs must have an MD, DO or equivalent degree, hold ECFMG certification,[4] have passed Steps 1 and 2 of the USMLE or equivalent examinations and meet any other state medical licensing requirements.

Immigration Requirements

To complete a residency and/or provide patient care, IMGs must apply for a visa suitable to their circumstances. Under the Immigration and Naturalization Act, most foreign nationals must obtain either a nonimmigrant (temporary) or immigrant (permanent) visa to live and, in certain circumstances, work in the United States. Nonimmigrant visas are designated by letters of the alphabet ranging from "A" to "V." Physicians may require one type of visa for purposes of interviews and taking the CSA exam, if applicable, and then another for purposes of employment or training. A chart summarizing the different visa types used for IMGs is appended.

Hagopian et al. (2003) examined the experience of state health departments with what is now called the “State 30 Program” that allows each state to recruit up to 30 IMGs per year to work in federally-designated Health Professional Shortage Areas. Although these IMGs must ultimately have their J-1 visa waivers granted by the Bureau of Citizenship and Immigration Services (formerly the Immigration and Naturalization Service, or INS), state requests for these waivers for identified IMGs are rarely denied. States report that most of the IMG physicians are placed with private employers, who are believed to be quite satisfied with the program. Physicians in the program, who sometimes report problems with working conditions, are reported to be somewhat less satisfied. In addition, relations between the

[4] In 44 states, U.S. citizens or permanent residents who have successfully completed the Fifth Pathway program do not need ECFMG certification. The Fifth Pathway program is available to U.S. citizens or permanent residents who complete their premedical work in a U.S.-accredited college, study medicine in a foreign medical school listed in the *World Directory of Medical Schools*, complete all requirements for admission to practice medicine except internship and/or social service and then wish to return to the United States for GME. Thirty-four states will endorse the Canadian certificate when held by an IMG.

states and the federal immigration authorities were reported to be less than ideal. The average number of J-1 visa waivers granted during the 2000-2001 fiscal year (the year of the study) was 13.5 IMGs per state, but that number will probably increase now that the program lid has been lifted to 30 physicians from the previous 20.

Push Factors

Little has been written on the IMG push factors. Mick and Pfahler (1995) found no contemporary studies of any kind, but speculated that push factors include: lack of specialty training available, political instability or repression, unpleasant living conditions, and the lack of a satisfying health system that provides jobs.

Pull Factors

The most significant factors that attract IMGs to the United States include favorable immigration laws, ample numbers of well-financed residency positions, post-residency practice opportunities, standard of living norms, and a long tradition of immigration to the United States.

Retention

Determining the annual numbers of physicians entering and leaving the United States, including their residency training status, would require data not now made available from the INS. The seminal work in this area is worth reviewing, even though it pre-dates 1995. Butter (1971) found the ratio of newly arriving IMGs vs. departing IMGs was 4:1 in the late 1960s. As referenced by Mick and Pfahler (1995), the authors below have tracked IMG resident tendency to remain in the United States after training. Haug and Stevens (1973) found 84 percent of IMGs who entered in 1963 still in the United States in 1971, and that 74 percent of those who entered for training were still here. Another study cited by Mick and Pfahler (Stevens, 1974) found 67 percent of 1964 residents were still here in 1971. They also cite Mason (1974), who tracked between 1957 and 1971, and thought 95 percent were still here by the end of the period. Once they arrive, between 66 percent and 95 percent of IMGs will find a means to stay permanently. Mick and Worobey (1984) found 76.2 percent of IMGs still in the United States in 1983 after arriving for training in 1973. Mick and Rubino (1992) tracked those certified between 1969 and 1982 and found virtually all of them still here in 1987, although 10 percent had unknown addresses. The conclusion we can draw from these studies is that IMG physician retention post-residency training is very high, perhaps 90 percent.

Mick and Pfahler (1995) suggest another approach is to use a global calculation: IMGs total 3,761 more per year each year over 50 years. Since 3,761 x 50 = 188,000, and it is estimated that 157,000 IMGs are in the United States, retention is estimated to be 83 percent.

A recent publication by British researchers (Young et al., 2003) indicates the British National Health Service identified the need for 7,500 more specialists and 2,000 more generalists, along with 1,450 residents, by the year 2004. A recruitment campaign was launched to attract physicians from North America, Europe, Australia, and the Middle East. The leading countries contributing to the influx of physicians to the U.K. between 1991 and 2000 were India (over 700 new physicians per year during the period), Germany (247 per year), South Africa (208), Australia (193), Ireland (189), and Egypt (107).

Eckhert (2002) notes that one fourth of the physicians in the nations of Canada, Australia, New Zealand, the UK and the United States are IMGs. The migration of South Asian physicians to the U.K. in the 1960s and 1970s was so high that health workforce planners now fear a potential scarcity of heath services as these doctors approach retirement. Eckhert also reviewed existing medical schools and did a survey of 130 medical schools selected at random from the schools in the World Health Organization (WHO) world directory for which the least data were available. He found that 157 countries have medical schools; 3 have more than 100 (China, India, United States). Europe has the lowest population ratio per medical school (1.67 million people per school) and sub-Saharan Africa the most (9.09 million per school). The United States has 2.19 million for allopathic schools alone and 1.71million if osteopathic schools are included. Growth in the number of medical schools was strong between 1955 and 2001, with the highest rate in sub-Saharan Africa (mostly since 1975). Nigeria has 27 percent of the region's medical schools. Growth rates are smallest in Europe and the former Soviet Union.

The Economist magazine published an article on skilled worker migration on 9/26/02. The authors suggested strategies for countries losing talent:

- Make it more attractive to stay home.
- Build meritocratic systems that reward education.
- Pay more to those who have been abroad and come home (watch for inequalities).
- Remove educational subsidies.
- Tax the diaspora.
- Extend dual citizenship to encourage return.
- Encourage Internet brain circulation.
- Offer short-stay returns for project work.
- Provide opportunities, political stability, good leadership, rule of law.

The Economist also advises rich countries to restrain themselves:

- Don't recruit scarce health workers from poor countries.
- Invest in tertiary education in poor countries.
- Make migration simple but temporary (they'll avoid leaving once they've entered if it's hard to come back).

Miller and Laugesen (1998) noted that physicians who emigrate to the United States from New Zealand and Australia are typically older, more often men, likely to be from Melbourne or Sydney, more likely to work in a medical school and not in a public hospital and more likely to be specialists. They go to urban places in the United States and end up predominantly in California (17.3% New Zealand and 16.2% Australian), Massachusetts (7.6% and 10.9%) and New York (7.6% and 11.7%). American physicians earn 2.9 to 5 times more than the average American worker, and 3.2 times more than the Australian physician. Australian workers earn 2.2 times more than the average Australian's salary. The United States has not discouraged physician immigration despite the problems this may be creating for the nations from which they emigrated.

While Australia and New Zealand lose these physicians, these two countries also import considerable numbers of physicians from other nations. Factors attractive to foreign students include: quality of medical schools, specialty training, and research opportunities. Factors that push students to leave their home countries include: frustration with advancement opportunities, dissatisfaction with organization and financing arrangements, social unrest, political repression, violence, overpopulation and poverty.

Chapter 4: International Medical Graduates and U.S. Graduate Medical Education (GME)

As Chapter 1 emphasized, graduate medical education (GME) serves as the central mechanism for determining numbers of physicians in the United States, including international medical graduates (IMGs). This chapter reviews the literature about IMGs and GME in the United States, including numbers of IMGs enrolled in GME and GME financing. It also reviews literature about IMG-dependent residency programs, nonaccredited medical education in the United States and trends and current issues in GME for IMGs, including in particular specialties.

Overview of IMGs in GME

In a 1996 health policy report in the *New England Journal of Medicine*, Iglehart (1996) notes that between 1988 and 1994, the number of IMGs entering U.S. residency programs more than doubled, from 2,201 to 5,891, whereas the number of U.S. medical graduates (USMGs) remained relatively stable, at 17,000 per year. GME financing comes from public and private revenues, including Medicare. In the 1980s there were several attempts to reduce Medicare support for GME for IMGs in the United States, including terminating all such support, limiting residency slots to 110 percent of the number of USMGs, as well as a freeze on positions. None of these measures were ultimately approved. The (ongoing) debate over IMGs attracts interest from a wide variety of private and public agencies, including teaching hospitals, the NIH and other biomedical researchers, federal and state agencies, legislators, professional medical associations, academic bodies, immigration lawyers and accreditation bodies. Most of these parties have narrow agendas, and rarely view IMGs in terms of overall physician supply. Iglehart also reviews the process by which IMGs can train and work in the United States, including immigration and visa waivers. New York, in particular, is dependent on GME funding for maintaining the urban safety net and has in the past, out of necessity perhaps, acted as a powerful pro-IMG lobby. Finally, he reviews possible expansions of the National Health Service Corps (NHSC) as an alternative to IMGs.

IMG-Dependent Residency Programs

Whitcomb and Miller (1996) compared residency programs that were dependent on IMGs to fill their positions with those that were not. The authors analyzed data from the National Residency Match Program (NRMP) to examine participation of IMGs and USMGs in the 1995 match and compared the pattern of USMG and IMG applications to programs in

1989 and 1995. Of 1,634 programs in six core specialties (internal medicine, family practice, obstetrics and gynecology, surgery, pediatrics and psychiatry), 469 were IMG-dependent programs, defined as those where at least 50 percent of first year residency positions were filled by IMGs, and 1,165 residencies were non-IMG dependent. Approximately 76 percent of applications to IMG-dependent programs came from IMGs, compared to less than 14 percent of applications to non-IMG-dependent programs. Almost 57 percent of applicants ranked by IMG-dependent programs were IMGs, whereas less than six percent of applicants ranked by non-IMG-dependent programs were IMGs. By comparing data from 1989 and 1995, Whitcomb and Miller found programs that enrolled IMGs experienced a progressive increase in the proportion of applications received from IMGs. The number of IMG applications to IMG-dependent programs increased by 88.7 percent between 1989 and 1995. The authors conclude that once GME programs start attracting IMGs, they continue to do so until they convert into IMG-dependent programs. The authors debate whether this process is reversible, i.e., whether IMG-dependent programs could recruit sufficient USMGs if the supply of IMGs in the U.S. residency workforce declined.

In a further study of the effects of IMGs on U.S. student opinion of residency programs, Riley et al. (1996) surveyed fourth-year medical students at 18 geographically diverse U.S. medical schools. They noted the proportion of IMGs in a residency program does appear to factor significantly in U.S. medical students' selection of hypothetical programs. However, students did not explicitly acknowledge that IMGs mattered to their program selection. This may offer some explanation for Whitcomb's observation that programs that attract some IMGs tend to attract increasing numbers.

Nonaccredited Medical Education in the United States

Kassebaum and Cohen (2000) offer an opinion piece on the comparison between the accreditation process for U.S. medical schools, and those that occur for IMGs. They review the accreditation of U.S. medical schools by the Liaison Committee on Medical Education (LCME), to which they attribute the high educational standards at U.S. medical schools. Although the LCME is the only organization that accredits medical schools in the United States, some foreign medical schools have organized accreditation mechanisms for rotations by their students in the United States. These include New York, New Jersey, and California, which sanction clinical clerkships by students from certain foreign medical schools within the states' jurisdiction. The foreign medical schools involved are mostly those situated in the Caribbean, such as Grenada, Dominica, and St. Maarten (formerly Montserrat), as well as Jamaica and the Dominican Republic. Medical schools in these countries also have informal relationships with many clinical sites in the United States for clinical clerkships, for which host hospitals are reimbursed.

Since 1966, the U.S. Department of Education has allowed U.S. citizens attending foreign medical schools to obtain federally guaranteed student loans. They report that an estimated $129 million in such loans were processed for U.S. citizen IMGs between 1986 and 1991. The authors report that the size of medical schools in these Caribbean countries may be increasing. Indeed, the number of ECFMG certificates issued to graduates of medical schools on Dominica, Grenada and St Maarten increased from 371 in 1995 to 722 in 1998. Kassebaum and Cohen feel that such medical schools circumvent LCME accreditation procedures, with the implication that they are offering a lower grade of medical education. They recommend more stringent standards of approval for students based in foreign medical schools who wish to participate in U.S.-based educational programs. These could include ensuring that state medical board approval of foreign schools or clerkships is based on more rigorous criteria and meets statutes governing medical licensure, and requiring the Department of Education to use LCME standards when establishing eligibility for participation in federally-guaranteed student loan programs.

Several letters to the Editor countered the arguments of Kassebaum, including letters from faculty at several of the criticized medical schools (Angelakos, 2000; Deal, 2000; Ferguson, 2000; Schmidt, 2000). Counter arguments asserted that such medical schools do receive some accreditation from U.S. bodies. Authors also state that the reviews of medical schools are in fact conducted by the states of New York and New Jersey, and that any clinical clerkships in the United States are also subject to regular assessment. Authors criticized the policies of the LCME (a private, nongovernmental body), which has openly stated policies in favor of reducing IMGs in the U.S. workforce. Concerns were expressed that the LCME has denied requests by at least two Caribbean schools for accreditation, despite the fact that the LCME accredits other foreign schools (i.e., Canadian schools). Faculty from Caribbean schools are frustrated that while they feel that they have comparable educational standards, admission criteria, and pass rates for USMLE to U.S. schools, they are denied LCME accreditation and are simply grouped with all other foreign medical schools. They argue that they are filling an important gap in providing well-qualified medical students for the United States.

Trends and Current Issues in GME Concerning IMGs

In Illinois, 35 percent of residents are IMGs, compared to the national average of 21 percent. Cooksey and Harman (1998) examined Illinois' growth in IMGs involved in GME and analyzed all residents in GME programs in the state, with data obtained from the AAMC GME tracking census. These data include annual surveys of residency directors with demographic and medical school location data for each resident from 1988 through 1996. Over this eight-year period, the number of residents in Illinois increased by 1,662 (38%). IMGs accounted for the large majority (71.2%) of this increase. The number of IMGs

increased by 127 percent compared to 14 percent for USMGs, so that by 1996, the proportion of residents who were IMGs rose from 21 percent in 1988 to 35 percent in 1996. The specialty that experienced the largest growth in relative terms was emergency medicine (128 residents, or 121%), while internal medicine and family medicine had the largest absolute increases (388 internal medicine residents, a 35% increase, and 179 family medicine residents, a 47% increase). This study of one important IMG state provides a striking view of the large increases in GME positions filled by IMGs.

The National GME Census is a joint AMA-AAMC initiative which is administered annually to program directors of all active Accreditation Council for Graduate Medical Education (ACGME)-accredited and combined programs to obtain information on all residents in their programs and recent graduates.

Summaries of the residents involved in GME programs are published yearly in JAMA. Details for 2001-2002 and the accompanying commentary are reviewed here (Brotherton et al., 2002; Graduate Medical Education, 2002). In the 2001-2002 academic year, there were 6,885 active programs with a total of 96,410 resident physicians enrolled in accredited GME programs. Of these, 68.1 percent (65,661) were USMGs, 26.3 percent (25,403) were IMGs, 0.4 percent (422) were Canadian, and 4.8 percent (4,658) were osteopathic physicians. Since 1996, the proportion of residents who are IMGs has remained stable at 25 to 26 percent, the proportion who are DOs has increased from 3.4 to 4.8 percent, and the proportion of USMGs remained stable at 68 percent.

For all IMGs currently in GME programs (25,403), GME (2002) noted that 5,404 (21.3%) were native or naturalized U.S. citizens, 6,823 (26.9%) were permanent residents, 5,473 (21.5%) were on J-1 or J-2 visa holders, 5,721 (22.5%) were of unknown status, and smaller numbers have B-1 or B-2 temporary visitor visas (60, 0.2%), or F-1 student visas (57, 0.2%). The overall number of PGY 1 positions filled by IMGs has decreased by 12.3 percent from 6,727 in 1999-2000 to 5,898 in 2001-2002. However, when only the 14,636 + 936 residents who enter GME immediately after graduation from medical school are examined, the number of IMGs has tripled, from 310 in 1996-1997 to 936 in 2001-2002. Moreover, the number of IMGs in this group who are U.S. citizens or permanent residents has increased from 253/310 to 611/936 over this period. The majority (74.4%) of such U.S. citizen/permanent resident IMGs were graduates of medical schools located in the Caribbean, namely Grenada (27.2%), Dominica (27.6%), Montserrat (8.9%), and other Caribbean countries (8.7%), compared to India (3.2%) and other countries (17.1%). The authors also noted that among the PGY1 IMGs for whom citizenship data were available, the proportion with J visas decreased from 37.6 percent in 1997-1998 to 23.6 percent in 2001-2002. The citizenship status of the 5,188 IMGs in PGY1 positions with no prior U.S. GME experience showed that 1,165 (22.8%) were U.S. citizens, 951 (18.3%) were U.S. permanent residents, 995 (19.2%) were non-U.S. citizens, and 2,077 (40.0%) had unknown citizenship. A

relatively greater proportion of IMGs were of Asian race or Hispanic ethnic origin, compared to U.S. and Canadian medical school graduates. The authors suggest that the growth in U.S. citizen IMGs (as well as DOs) may be making up for an inadequate number of USMGs. In addition, they note that the declining number of J visa IMGs may be accompanied by a decline in J-1 visa waivers, with possible implications for underserved areas.

IMG GME Issues Related to Particular Specialties

Anesthesiology

Grogono (Grogono, 2001) details the fluctuations in the contribution of IMGs to anesthesiology programs since the 1960s. From 1960-1972, the proportion of IMGs in anesthesiology residency programs increased steadily to a peak of 58 percent (1,194/2,053) in 1972. From there it fell to a nadir of 9 percent (or 421/4,563) in 1988 and was relatively stable until the mid 1990s. Since that time, however, the proportion of IMGs increased dramatically to another peak of 58 percent (or 2,285/3,963) in 1999. However over recent years the proportion has once again fallen to 41 percent (1,907/4,636) in 2001. The author speculates that the most recent increases in USMG interest in anesthesiology reflect the waning of national interest in managed care and primary care.

Between 1994 and 1996, the number of USMGs entering anesthesiology residency training fell dramatically (Schubert et al., 2001). As a possible consequence, the number of accredited anesthesiology residency programs decreased by approximately 20 percent from 125 programs in 1992 to fewer than 100 in 1998. As a result, the numbers of anesthesiology residents graduating annually continued to decline through 2000. The number of graduating anesthesiology residents decreased from 1,796 in 1995 to 919 in 2000 (Grogono, 2001). It was thought that student interest in this specialty had declined owing to projections of a relative anesthesiology surplus in the 1990s, coupled with the growth of student interest in primary care. The shortfall in USMG applicants to anesthesiology residencies was taken up by IMGs; by 1998 more than 50 percent of anesthesiology residents were IMGs, an increase of more than 300 percent in five years. The authors predict that the reduction in anesthesiology programs, coupled with the rise in IMGs graduating from these programs, may give rise to a significant and possibly lasting shortfall in the anesthesiology workforce, especially if current trends in health care, clinical services and population demographics continue.

Pathology

U.S. student interest in pathology residencies declined substantially in the mid 1990s, although there had been a trend of declining interest for the prior 10-15 years (Alexander, 2001). Kant (2001) discusses the disparate standards that exist in recruiting USMGs and

IMGs to pathology residency programs. Overall, only 8 percent of USMGs do not participate, or withdraw from the NRMP match, compared with 45 percent for IMGs. In pathology, Kant notes that this creates pressures on residency directors and applicants alike. IMG applicants may exert pressure on programs to offer them positions outside of the match, and residency directors may choose to offer positions outside of the match in order to make sure that their program fills all training slots. Residency directors face pressures to fill programs in order to maintain the reputation of their program, and hence attractiveness to USMGs. The author speculates that these competing conflicts have resulted in a dual recruitment system that is not only detrimental to the specialty, but also forces residencies to operate outwith the spirit of the NRMP.

Physical Medicine and Rehabilitation

Although the number of residency positions in this specialty almost doubled, from 756 in 1984 to 1,302 in 1997, the proportion of positions filled by USMGs peaked at 94 percent in 1992 and declined to 73 percent in 1997 (American Board of Physical Medicine and Rehabilitation, 1997). A survey in 1997 of all 72 current PM&R department chairs regarding resident recruitment found that 62 percent of chairs reported more difficulty recruiting USMGs compared to two years prior (Braddom et al., 1998). Survey respondents noted they were having less difficulty recruiting IMGs, suggesting that the declining/plateau in USMG interest in this specialty was being compensated by increasing numbers of IMGs.

Family Practice

The declining number and proportion of family practice (FP) residency positions filled by USMGs has been well documented (Braddom et al., 1998; Pugno et al., 2000; Pugno et al., 2001). Koehn et al. (2002) examined the 1992-2001 NRMP results, the 2000 AMA Physician Masterfile and the 1992-2001 American Academy of Family Physicians (AAFP) annual survey of family practice residency programs. Overall, more than 95.5-97.8 percent of first year FP positions have been filled by July over this period. However, the proportion of total positions filled by USMGs has fallen from a peak of 79.1 percent in 1996 to 56.71 percent in 2001. The remainder of positions are being filled by IMGs, with the proportion of July PGY1 slots filled by IMGs increasing from 11.21 percent in 1996 to 29.41 percent in 2001. While citizenship of IMGs entering FP residencies has varied over this period, in 2001, 57.1 percent of such IMGs were U.S. citizens, and 43.1 percent were non-U.S. citizens (i.e., permanent residents or nonimmigrant visa holders). Over half (55.6%) of FP programs in 1999 had at least one IMG, and of these, 48 (9.6%) were dependent on IMGs (i.e., at least 50% residents were IMGs) and eight programs (1.6%) were entirely composed of IMGs. Nationally, 15.1 percent of FP residents are IMGs, however in several states this figure exceeds 25 percent, including New York (48.8%), Michigan (32.0%), New Jersey (30.5%), Illinois (28.3%), and Connecticut (27.8%).

The authors note that U.S. citizen IMGs form an increasing percentage of the IMGs entering FP residencies, with most of these physicians graduating from medical schools in the Caribbean countries of Montserrat, Grenada or Dominica. They express concerns about the higher attrition rate generally for IMGs then USMGs in family practice residencies, coupled with a possibly lower level of commitment to this specialty. In an accompanying commentary, Pugno and McPherson (2002) reiterate that many IMGs fill positions after the Match, and may have a higher attrition rate than USMGs, suggesting that some IMGs may choose FP opportunistically, i.e., simply because program slots are available, rather than due to a specific commitment to this specialty. The authors call for more research on the comparisons between U.S. citizen IMGs and non-U.S. citizen IMGs.

Chapter 5: Gap-Filling Roles of IMGs

The literature on how IMGs contribute to the health care safety net in the United States is limited to a few authors. The preponderance of the evidence is that IMGs are somewhat more likely than their USMG counterparts to serve poor, rural, or otherwise underserved patients, but there is no consensus position on this.

Broad Policy Pieces

Fitzhugh Mullan, who advocates reducing our IMG dependence and promoting a National Health Service Corps expansion, wrote a piece for JAMA in 1995 reviewing the history of IMG supply fluctuations in the United States, and IMG policy to date (Mullan, 1995). He describes the pathways to immigration for IMGs, and notes that 40.1 percent of internist residents are IMGs, as are 30.1 percent of pediatric residents. Mullan says 5,000 IMGs join the permanent U.S. physician workforce every year. He questions the justification for the continued importation of this number of physicians at the expense of the nations that send them.

John Iglehart (1996), in one of his policy survey articles for the *New England Journal of Medicine,* assumes IMGs care for "millions of people, many poor, in inner cities and rural communities." While this is undeniably true, if the import of IMGs were stopped or curtailed, those positions might be filled by USMGs. Iglehart does acknowledge that "once they have completed their residency training, most graduates of foreign medical schools set up office-based practices in densely populated urban and suburban areas and pursue medical subspecialties with the same zest as their U.S. counterparts." Iglehart reports that half of all IMGs in residency training are in New York, Illinois, Pennsylvania, and New Jersey. These states have "what is tantamount to veto power on this issue" when they have powerful senators, which they did at the time of Iglehart's article. Iglehart also notes that teaching hospitals make more money than they spend on residents, so the hospitals that provide high levels of care to poor people are eager to hire residents to offer these services. Cornell's New York Hospital estimated $190,000 per resident per year is put into hospital rates.

Overall Distribution of Physicians

A number of authors address the overall physician maldistribution issue. While 20 percent of the population lives in rural areas, only 9 percent of physicians practice there (Geyman et al., 2000). Rosenthal (Rosenthal, 2000) suggests rural training tracks are successful in placing physicians in rural areas, but have very small enrollment (only 100

graduates in the 1990s). Some medical schools do a good job of meeting a generalist, rural-oriented mission (Rabinowitz & Paynter, 2000). Family practitioners are the only specialty group that distributes itself proportionally to the population in rural and urban areas (Rabinowitz & Paynter, 2002). Known predictors of rural primary care practice choices include rural background, plans to enter family practice before medical school, having a NHSC scholarship, spousal influence, economic issues, rural clinical rotation and not being a woman. For inner city practice, predictors are prior expressed interest, being an underrepresented minority, and having NHSC financing.

Kenneth Fink et al. (2003) analyzed the proportion of IMGs serving as primary care physicians in rural underserved areas. Using AMA Masterfile and Area Resource File data, the authors found USMGs were more likely to be family physicians but less likely to be internists or pediatricians. IMGs were also found to be just as likely as USMGs to practice primary care in rural underserved areas.

Hagopian et al. (in press) have described the role of IMGs in small, rural critical access hospitals across the U.S. They found 45 percent of 329 hospitals surveyed had one or more IMGs on staff, that 24 percent of the entire physician pool serving these hospitals were IMGs, and that more than half the responding hospitals had more than one IMG.

The Mick Series

Stephen Mick has a series of articles based on an analysis of the AMA Masterfile and some linked demographic databases. His basic formula is to dichotomize counties by several measures of need (infant mortality, physician-to-population ratio, socioeconomic status, nonwhite, metro/nonmetro, over the age of 65), declaring them "needy" counties or not. He then calculates the number of IMGs in the needy counties and divides by the number of IMGs in the whole state. Then the same calculation is made for USMGs. The IMG proportion is then subtracted from the USMG proportion to yield a difference of percentages. A negative value indicates an IMG disproportion, and a positive value signals a USMG disproportion. Aggregating the values for the counties, each state gets a total "disproportion" value. The above technique, or a variant, is used in four different articles: *Social Science & Medicine* (Mick et al., 2000), *Health Affairs* (Mick & Lee, 1997), *Journal of Urban Health* (Mick & Lee, 1999b), and *Journal of Rural Health* (Mick & Lee, 1999a). The underlying null hypothesis in these studies is that IMGs are no differently distributed than USMGs when it comes to locating in counties characterized as needy.

Mick describes the dichotomous theories about IMGs. One theory is that IMGs remedy the distributional imbalances of physicians generally and contribute to the safety net, and the other is that the United States has too many physicians but not enough primary care physicians, IMGs are crowding out USMGs, and we are paying too much for GME. Mick

acknowledges that safety nets have not been the sole domain of IMGs, and physician supply has continued to grow (thanks to huge federal largesse), largely because of USMGs. Allowing physicians total freedom to choose specialty and practice setting while subsidizing those choices, has led us to where we are.

The general conclusion in this series of articles is that IMGs *do* disproportionately contribute to the safety net in needy communities. IMGs are disproportionately high in counties with excess infant mortality, low socio-economic status, high minority proportions, and nonmetropolitan status (Mick et al., 2000). IMGs are also more likely to be found in counties with high infant mortality and low physician-to-population ratios (Mick & Lee, 1997). Calculations were done for only the rural counties (Mick & Lee, 1999b), with findings similar to those above. There were more primary care and even more specialty care IMG disproportions than USMG disproportions across all five measures of need. Socioeconomic status and physician-to-population were especially significant.

In Mick and Lee (1999a), calculations were done for U.S. cities stratified by population. The method was to divide the number of IMGs (and then again USMGs) in high-poverty ZIP codes by the total number of IMGs (and then again USMGs) for the whole city. Combined, the proportions of IMGs in high-poverty areas of cities totaled 29.6 percent. IMGs were distributed more or less like USMGs across poverty and nonpoverty areas, but some cities had significantly more IMGs in high-poverty areas (New York, Chicago, Los Angeles). IMG presence in high-poverty ZIP codes corresponded more with the large number of IMGs in the entire city, rather than with concentrations in poverty areas. IMGs were less likely to be found in smaller cities (perhaps because residency programs were more likely to be in large cities). Mick et al. (2000) notes that 29.5 percent of physicians in low SES counties are IMGs, and half of physicians in Florida's low SES counties are IMGs. The Midwest and South have higher IMG disproportions (Mick et al., 2000). All doctors are concentrated in urban areas, and 75 percent of IMGs are in only ten states (as are 52% of USMGs): New York, California, Florida, New Jersey, Illinois, Texas, Pennsylvania, Ohio, Michigan, and Maryland. The vast majority of physicians, regardless of origin, are located in nonpoor SES counties (Mick et al., 2000). In places where the need for physicians is low, IMGs may be exacerbating a surplus (Mick et al., 2000).

A cohort of physicians who finished training in 1982 was followed to determine their practice locations in 1987. Four census divisions had an excess of IMGs (beyond what would be expected if distributed evenly), with the East South Central division having the biggest difference (7.2%), and West North Central next (at 3.5%). USMGs dominated in New England (6%) and the Pacific (3.8%) (Mick & Sutnik, 1996). The larger the proportion of all medical graduates located in nonmetro counties in a census division, the more likely it was there was an excess of IMGs; 18.4 percent of physicians in the smallest counties (under 10,000 population) were IMGs, compared to 16 percent in counties of 50,000 and higher.

The Baer Series

Leonard Baer and colleagues have three publications in this area. Baer et al. (1998) looked at IMG service in rural Health Professional Shortage Areas (HPSAs). Using the 1996 AMA Masterfile and the 1997 Area Resource File, the authors found 18.7 percent of all primary care physicians were IMGs in nonmetro whole-county HPSAs, compared to 15.2 percent in nonmetro partial-county HPSAs, and 14.3 percent in nonmetro nonshortage areas. Baer noted that factors that attract IMGs to underserved areas included the location of other IMGs, employer preference, ethnic communities, and proximity to residency training sites and immigration attorneys. They concluded that IMGs are proportionately more likely than USMGs to practice in rural, underserved areas, but there is lots of interstate variation.

For a University of North Carolina working paper (Baer et al., 2000), Baer and colleagues conducted interviews with a variety of health planners and physician recruiters in the states of Florida, New York, North Dakota, and West Virginia (high IMG states), and AMA Masterfile data were analyzed. Almost a third (30%) of rural counties are "short" physicians (per the Office of Shortage Designation), and this would rise to 44.4 percent if IMGs were removed. Twenty percent of now-adequately served counties would become shortage counties. Fifty-one nonmetro counties would lose all their physicians if IMGs were removed (the number of counties without any physicians would rise from 161 to 212 counties). As an alternative to IMGs, informants would welcome an expansion of the NHSC, but some states had criticisms of NHSC, such as the fact that it relies on sometimes-artificial shortage area designations, that it's "top down" and bureaucratic, and that there is turnover among physicians assigned to communities. As a response to a potential loss of IMGs, multifactorial solutions would be required and midlevel providers not perceived to be a replacement.

Baer et al. (1999) also did a survey of community health center administrators, and learned that IMGs are easier than USMGs to recruit, they are no different than USMGs or NHSC physicians with regard to retention, they accept lower salaries, and they are less accepted by patients. More than one in four community health center (CHC) physicians was an IMG (27.5%), and a policy to cut back IMGs would be perceived negatively by this group. Administrators said 57 percent of their FTE positions currently held by IMGs would be unfilled if not for IMGs, accounting for 15.7 percent of positions overall. Twenty-three percent of CHC administrators said their organizations were "dependent" on IMGs.

Teaching Hospital Dependency on IMGs

Blonski and Rahm (2003) compared the performance of family practice residents selected through the National Resident Matching Program with those selected outside that process, and that of USMGs compared to IMGs. Surveys of residencies demonstrated that

87.4 percent of residents were selected through the Match, and 89.2 percent were USMGs. IMGs were found to be more likely than USMGs to leave their programs before graduating (8% compared to 5.2%).

Michael Whitcomb, known to advocate the Association of American Medical Colleges (AAMC) position of reducing the U.S. reliance on IMGs by reducing the number of residency positions to more closely match the number of U.S. medical school graduates, did a study (Whitcomb & Miller, 1995) to identify the number of teaching hospitals that are "dependent" on IMGs for their medical house staff roles. The study focused on six specialties (internal medicine, family practice, obstetrics/gynecology, surgery, pediatrics, and psychiatry). To be considered IMG-dependent, the teaching hospital had to be the principal teaching site for a GME program in two of the six specialty areas, and the hospital's patient population had to be at least 20 percent Medicaid (or equivalent). "Only" 77 hospitals were judged to meet both these criteria, and 26 of these were in New York. Texas had 7, New Jersey and Michigan had 6 each, and Illinois had 5. Whitcomb says: "One third of IMG physicians and 40 percent of IMG-dependent residency programs are based in hospitals that don't provide disproportionate care to the poor." The corollary, of course, is that the large majority of IMGs and IMG-dependent programs ARE in facilities that serve the poor.

Medicaid Mill IMGs in New York City

In a footnote to the safety net literature, Gerry Fairbrother (Fairbrother et al., 1995) examined "Medicaid mill" private storefront physicians in New York City, who were estimated to account for 25 percent of all pediatric providers serving poor neighborhoods in that city. The Medicaid mill doctors were almost all (91%) IMGs, many of them Asian, and more than half were female. They were judged to be fairly low-quality physicians (only 42% board certified, 49% had hospital privileges), and the concerns included the lack of well-child preventive care, lack of immunization expertise or practice, and low volume of screening.

Thompson et al. (in progress) are producing a paper describing the settlement patterns of IMGs using a level of geographical analysis that suggests IMGs may be contributing more to the safety net system than previously thought. Mick et al. (1999) think the safety net (gap filling) versus surplus arguments are the most compelling, and has satisfied himself that IMGs fill gaps in the U.S. health care safety net. They note that the Whitcomb and Miller paper (1995) identified only 77 "serving the poor" hospitals that were IMG dependent and would have very different results with slightly different measurement criteria. While most IMGs are not serving in underserved areas, they are more likely to do so than their USMG counterparts.

Chapter 6: Quality of International Medical Graduates

Introduction

The quality of clinical care provided by international medical graduates (IMGs) is an area of intense interest in the debate, based on the premise that physicians trained outside of the United States or Canada (USMGs) circumvent the sequential stages of education and training typical for such USMGs. In the United States and Canada, physicians typically undertake a four-year undergraduate college education, followed by four years of medical school, before moving on to a three- to five-year graduate medical education (GME) or residency program, sometimes with an additional one to three years of fellowship training. In other countries, many students enter a five- to six-year medical school curriculum directly after graduating from high school. They may then undergo postgraduate training and clinical practice in their home countries before applying for Educational Commission for Foreign Medical Graduates (ECFMG) certification to allow them to move to the United States for GME and fellowship training. Although IMGs must graduate from a medical school recognized by the World Health Assembly as a prerequisite for ECFMG certification, there is considerable variation in educational standards even among these medical schools. In addition, proficiency in the English language may vary among graduates of non-English speaking countries in comparison to USMGs.

For this review of post-1995 literature on the quality of IMGs, we utilize the structure/process/outcome scheme of Donabedian (1988) to provide a framework to organize these studies. Structural measures of quality attempt to determine what is important for a physician to know to provide competent clinical care. Test scores are one way to measure this, however there are some forms of knowledge not assessed on tests. Process measures attempt to determine whether physicians perform the required processes of delivering care, such as following recommended procedures or guidelines measures, focusing on the application of knowledge and skills to clinical practice. Finally, outcome measures attempt to assess clinical outcomes such as mortality or complication rates. It is thought that these three aspects of quality of care follow in some continuum and are sequentially linked and dependent on their precursor, so that, for example, patient care outcomes are dependent on process elements, which are dependent on structural elements of care.

Much of the literature on the quality of IMGs focuses on structural measures. While initial ECFMG examinations were not as rigorous as those required of USMGs, in 1989 IMGs were required to take the same examination—the National Board of Medical

Examiners (NBME) as USMGs. Some states also required IMGs to take an additional examination for state licensure—the Federal Licensing Examination (FLEX). However, since 1991, the ECFMG has phased out these examinations and now requires IMGs to pass the United States Medical Licensing Examinations (USMLE) steps 1 and 2 in order to apply for ECFMG certification.

Medical licensure requirements attempt to ensure physicians in the state are qualified to practice medicine, but licensure requirements vary between states, and often the standards are different for USMGs than IMGs. For example, years of training required in an accredited GME program or the type of examination passed can be different for IMGs. Many physicians take one of the 23 specialty board examinations in the United States, each of which has its own procedures for certification, as an attempt to "brand" their proficiency in a particular specialty.

This literature review includes a summary of a recent comprehensive review by Mick and Comfort (1997), and then reviews other studies published since 1995.

Mick et al. Review of IMG Quality Literature, 1997

Mick and Comfort's (1997) extensive review of the literature between 1975 and 1997 on the quality of care provided by IMGs yielded 88 publications. The majority of these studies (46, or 52%) focused on structural measures of quality, while the remainder focused on process measures (22, or 25%) or outcome measures (20, or 23%). They reported on the results of 48 of these studies in their review. The 40 excluded were primarily of structural measures that were based on previously published data and not original publications.

Structural Measures

The primary structural measure of quality used in the articles reviewed by Mick and Comfort was examination scores. Test performance by IMGs has been lower than that of USMGs, and this has persisted over the course of changing examinations (FMGEMS, NBME, FLEX, USMLE) for IMGs. It is clear that IMGs do not pass these examinations with scores that are as high as the expected scores of USMGs. However, IMGs have tended to achieve approximately the same pass rates over the years despite the fact that examinations have become longer and presumably more difficult.

Mick and Comfort quote the most recent data for step 3 of the USMLE, which indicates pass rates of 94 percent for U.S. and Canadian graduates, compared to 58 percent for IMGs. Such findings may indicate that there is a substantive difference between IMGs and USMGs. Alternatively, it may be that IMGs and USMGs have different goals in respect to

such examinations; "merely" passing the USMLE may be sufficient for IMGs, and the score that they achieve may be secondary, perhaps in contrast to USMGs, for whom test scores may be of greater importance. In addition, almost all USMGs take USMLE steps 1 and 2 during medical school (and passing them is a requirement for graduation at many U.S. medical schools), in contrast to many IMGs, who may take these examinations after graduation from medical school. Taking the tests at this later date may place them at an academic disadvantage. The USMLE examinations are now required for both USMGs and IMGs.

Mick and Comfort (1997) identified no studies that have used licensure as a means of studying quality. A number of the studies they reviewed are summarized below. To compare board certification rates, Mick and Rubino (1992) did find that 46.9 percent of IMGs and 74.0 percent of USMGs were board-certified. However, the data on practice specialty (and board certification) obtained from commonly-used sources, such as the AMA physician Masterfile, are flawed by the use of self report for this variable.

During residency training, many specialties have opportunities to help trainees assess their preparation for board certification examinations. The Internal Medicine In-Training Examination (ITE) is a self-assessment examination taken each year by almost all second-year internal medicine residents, as well as most first- and third-year residents. It is thought to be highly reliable and appears to be predictive of subsequent performance on the certifying examination of the American Board of Internal Medicine. Mick and Comfort cite a report of the ITE for the period 1988-1993 indicates the average scores for IMGs were below those of USMGs at each level of residency training (Garibaldi, 1994). They also name a small study from the Mayo clinic (Dupras, 1995) that compared internal medicine residents using an "objective structured clinical examination" (OSCE), and noted no difference in the average scores of IMGs and USMGs. A study that retested practicing internists who had been board certified 5-15 years earlier, also revealed significantly lower scores for IMGs compared to USMGs. A study of genetics knowledge has also indicated lower knowledge among IMGs compared to IMGs.

In two reports from the American College of Physicians, Waxman reported on the scores of USMGs and IMGs on the ITE held in 1995 and 1996 (Waxman, 1997; Waxman et al., 1996). In reviewing the mean scores on the ITE for USMGs (with 2,778, 3,277, and 2,056 residents in each of PGY-1, 2 and 3) with the scores of IMGS (2,803, 2,948, and 2,391 residents for PGY-1, 2 and 3 respectively), IMGs appeared to score significantly higher than their USMG counterparts in each of the three years. Moreover, the gap between the IMGs and USMGs appeared to widen over this period with scores of 58.7 versus 61.0 (USMG versus IMG PGY1), 64.3 versus 66.1, and, 67.9 versus 70.6. These results suggest that the large pool of IMGs who enter internal medicine training programs in the United States appear to perform better than their U.S. counterparts, at least in this domain. This may reflect the fact that many IMGs have undertaken clinical training prior to coming to the

United States for residency training. These studies provide findings contrary to many of the other studies on structural measures noted previously.

In sum, with the exception of two studies, all structural studies reviewed by Mick et al. revealed that the medical knowledge of USMGs is greater than that of IMGs. What is not clear is the meaning of such differences, their magnitude when compared to other factors, and whether they predict any differences in quality of care.

Process Measures

Mick and Comfort's (1997) review of process measures identified the Rhee studies (1976-1981), which used a measure of physician quality—the Physician Performance Index—to measure performance according to physicians' compliance with medical norms. These studies did not show any differences between IMGs and USMGs in both hospital and ambulatory settings. Rhee hypothesized that it is was the forces subsequent to medical education that affected performance, which might include residency training, practice setting, amount of experience, as well as present work environment. The Saywell-Studnicki studies (1976-1983) used two inpatient hospital audits to compare USMG and IMG attending physicians and residents. No differences were found between USMGs and IMGs; any differences in physician performance were more strongly associated with hospital characteristics than physician characteristics.

In 1998, the ECFMG implemented its Clinical Skills Assessment (CSA), a new requirement for ECFMG certification. The CSA consists of encounters with standardized patients in order to assess skills in data gathering (i.e., taking history and performing physical examination), composing patient notes, and doctor-patient communication. IMGs can only take the CSA after passing USMLE Step 1 and English language tests, and the CSA is offered only once per year at a single U.S. location (Philadelphia).

Mick and Comfort (1997) identified only a single study (Conn & Cody, 1989) on the then-new ECFMG Clinical Skills Assessment (CSA) that is now required of all IMGs. This study compared 635 IMGs and to 123 USMGs, and found that the clinical skills of 28 percent of IMGs were inadequate when compared to the USMGs.

Peitzman et al. (2000) compared the performances of a group of 71 U.S. citizen IMGs (i.e., those U.S. citizens who chose to go overseas for medical school) with a group of 247 non-U.S. citizen IMGs. This standardized OSCE-type examination utilized standardized patients to test subjects' skill levels in eight physical examination tasks and a single case scenario. U.S. citizen IMGs appeared to have significantly superior clinical skills than the non-U.S. IMGs in four of the eight physical examination tasks and for the single case scenario. Unfortunately, this study did not compare IMGs with USMGs, and used only a

limited set of basic standardized clinical tasks. It is not clear whether the differences noted would be significant in a clinical setting.

In a further comparison of the performance of IMGs and USMGs on standardized clinical skills examinations, Ben-David et al. (Ben-David et al., 1999) compared a group of 33 foreign medical students (or graduates) who were in the process of applying for their ECFMG certification, with 151 fourth-year U.S. medical students who took a clinical skills exam in 1996 as part of pilot studies conducted by the NBME. Using a series of 12 cases involving standardized patients to assess four clinical skill areas (history taking, physical examination, communication and interpersonal skills) the mean performance of the IMGs was lower in all areas tested (significance not reported) compared to the U.S. students.

In a further study of internal medicine and pediatric residents' clinical skills, Ozuah et al. (2001) compared a group of 148 first year residents, of whom 113 were USMGs and 35 were IMGs. They used an observed examination of a single patient to compare residents' skills in each of 13 skill areas. In all skill areas, USMGs performed significantly worse than the IMGs, with no differences noted between specialties or among residency training programs. Interestingly, the USMGs in this study, based on their medical school academic performances, were in the top quartile of USMGs of that year. The authors suggest the IMGs' superior performance may be a direct result of their having passed the clinical skills assessment examination that is now required in order to gain ECFMG certification. Alternatively, this may be due to the fact that the IMGs may have undertaken clinical training and practice in their home countries prior to coming to the United States.

Yao and Wright (2000) conducted a survey of all 404 internal medicine residency directors to gain a better understanding of the prevalence, identification, management and prevention of problem residents. Of the 298 (74%) who responded, directors were asked to identify the personal characteristics of residents who were more likely to be problematic. The perception of program directors was that residents who were older than 35 years, IMGs, or of an underrepresented minority group were at greatest risk of being identified as a problem resident. However, as the percentage of older residents, minorities and IMGs increased in a program, program directors were less concerned about the potential for poor performance of these residents. Indeed, in programs with high proportions of IMGs, they were significantly less likely to be identified as problem residents.

In a survey (Yao & Wright, 2000) of 201 of the 414 directors of internal medicine residency programs (response rate 49%), the majority (83%) rated IMGs' performance as good or outstanding. However, 58 percent would like more careful scrutiny of IMG applicants, and 21 percent would support legislation that eliminates funding for IMGs. Reported advantages of IMG applicants appeared to be their previous clinical experience and work ethic, while reported disadvantages included cultural and language barriers and the

possible denigration of a program's reputation. Furthermore, a significant minority (37%) felt that pre-residency training of all IMGs was needed. This study was limited by the low response rate and a survey that treated all IMGs as a homogeneous group.

A more recent study (Whelan et al., 2002) aimed to determine the effects of the CSA, as well as the more recent computerization of the USMLE exams, on the pool of IMGs attempting to gain ECFMG certification. The authors examined ECFMG records of IMG performance in USMLE, CSA, and English language tests for the period 1995-2001. The number of IMGs taking USMLE Step 1 decreased by 45.5 percent from 136,983 (1995) to 16,828 (2001). Similarly, the numbers taking Step 2 decreased by 38.1 percent from 31,751 (1995) to 12,122 (2001). Consequently, the number of ECFMG certificates issued fell by approximately half, from 9,525 to 11,814 per year during 1995-1998, to only 5,211 to 5,934 per year since 1999.

The demographics of those IMGs sitting the CSA since 1999 show relative stability of gender (approximately 60% male) and ethnicity (30-40% white, 30-40% Asian). In 1999, immediately following the introduction of the CSA, the majority (40.9%) of IMGs were U.S. citizens, with smaller proportions from India (11.7%), Pakistan (3.2%), or China (2.7%). By 2002, however, these proportions were 22 percent, 20 percent, 7 percent, and 3.4 percent respectively. In addition to fewer overall ECFMG certificates being issued, the countries to which these certificates were mailed show a trend towards a decreasing proportion being sent outside the United States or Canada. This suggests that increasing numbers of IMGs (perhaps U.S. citizen IMGs) are residing or taking examinations in the United States.

The authors also examined pass rates for Step 1, Step 2, and the CSA for IMGs overall, U.S. citizen IMGs, USMGs, and non-U.S. citizen IMGs. They noted that the pass rate for IMGs overall sitting Step 1 for the first time increased from 57.5 percent in 1997 to 65.7 percent in 2001, and that the pass rate for non-U.S. citizen IMGs increased from 57.6 percent to 68.3 percent. However, the Step 1 pass rates for U.S. citizen IMGs did show some increase from 1997-1999, but in 2001 fell to 55.4 percent, the lowest in the study period and lower than the other two groups. The pass rates for Step 2 also increased between 1997 and 2001 for IMGs overall and non-U.S. citizen IMGs (from 53% to 79%-80%) and U.S. citizen IMGs (56.9% to 76.1%). Finally, although the CSA did undergo some changes in standards over this period, overall pass rates fell from 96-97 percent in 1999-2000 to the current levels of 80 percent. U.S. citizen IMGs have significantly higher overall pass rates in the CSA compared to non-U.S. citizen IMGs (88.6% vs 79.7%), largely due to higher pass rates on the doctor-patient communication component of this test. The authors conclude that the overall decrease in the numbers of IMGs seeking ECFMG certification may be attributable to the addition of the CSA. This may reflect lack of familiarity with this type of testing, or logistical and financial impediments to taking this test. The authors also note that first time

pass rates for USMLE exams have generally increased in recent years, perhaps reflecting a self-selection process of better prepared candidates.

Outcome Measures

Although Mick and Comfort (1997) did not identify any outcome studies to explicitly compare IMGs and USMGs, Burns and Whotley (1991) examined the correlation of medical school location (among other characteristics) on length of hospital stay and mortality rates for16 medical and surgical conditions. They found that IMG vs. USMG status had little influence on the odds of patient mortality or length of stay. A study examining complications following carotid endarterectomy (Brook et al., 1990) found a significantly higher complication rate for surgeons who were not graduates of U.S., Canadian or Western European medical schools. Finally, a study examining rates of Caesarian section (Tussing & Wojtowycz, 1993) performed for deliveries in New York State found a significantly higher rate of this procedure for IMGs compared to the sample overall. Seven studies reviewed by Mick and Comfort examining medical malpractice have not indicated any differences in the rates of litigation between USMGs and IMGs.

Summary

This review of the literature since 1995 on the quality of care provided by IMGs, builds on the extensive review published by Mick and Comfort in 1997. Previously, structural measures of quality of care by IMGs all appeared to indicate lower test performance by IMGs in ECFMG examinations, in-training examinations, and board certification rates. However, recent studies offer evidence to the contrary, with several reports of higher test scores by IMGs. The reasons for this apparent change in these (albeit limited) structural measures is unclear, but this may indicate improved screening of IMGs by the ECFMG certification process, particularly the new CSA, improved quality of IMGs entering the United States, or selection bias in specific circumstances. As noted earlier, the relationship of higher or lower test scores to actual clinical performance and patient outcomes is unclear and has not been resolved by any of the reviewed studies. Additionally, as noted by Rhee (in Mick & Comfort, 1997) over two decades ago, it may be that medical education itself has a very limited effect on process and outcome measures, and that it is the ongoing practice environment that is of more importance in providing quality of clinical care for both USMGs and IMGs. The few studies that have assessed process measures, limited to clinical skills, provide conflicting evidence regarding the quality of IMGs clinical skills compared to those of USMGs. However, all these studies have involved standardized type test situations, and none have used any hospital or ambulatory measures of “real life” clinical performance. Finally, there are no studies to add to the previous literature on clinical

outcomes comparing IMGs with USMGs. In conclusion, it appears that evidence regarding the quality of IMGs in comparison to USMGs is perhaps even more ambiguous than previously reported. This stems from the difficulties that researchers have had in measuring quality and in linking structure with process with outcomes.

List of Acronyms

BBA	Balanced Budget Act of 1997
CSA	Clinical Skills Assessment
GME	Graduate Medical Education
ECFMG	Educational Commission for Foreign Medical Graduates
FLEX	Federal Licensing Examination
FMG	Foreign Medical Examination
IMG	International Medical Graduate
LCME	Liaison Committee on Medical Education
NBME	National Board of Medical Examiners
NRMP	National Residency Match Program
USMG	United States Medical Graduate
USMLE	United States Medical Licensing Examination

Literature Cited

Alexander, C. (2001). Trends in pathology graduate medical education. *Human Pathology*, 32, 671-676.

American Board of Physical Medicine and Rehabilitation (1997). Survey of PM&R residency training programs - August 1997. *AAP Newsletter*, 36(Winter).

American Medical Association (1999). *Demographics of IMGs*. Available at http://www.ama-assn.org/ama/pub/category/1550.html. Accessed November 8, 2002.

American Medical Association (2002). *Physicians' professional record (AMA-PPD)*.

Angelakos, E. T. (2000). Nonaccredited medical education in the United States. *New England Journal of Medicine*, 343(15), 1120-1121; author reply 1123.

Baer, L. D., Konrad, T., Miller, J. (1999). The need of community health centers for international medical graduates. *American Journal of Public Health*, 89(10), 1570-1574.

Baer, L. D., Konrad, T. R., Slifkin, R. T. (2000). *If fewer international medical graduates were allowed in the US, who might replace them in rural areas?* Working Paper 71. Chapel Hill, NC: University of North Carolina.

Baer, L. D., Ricketts, T. C., Konrad, T. R., Mick, S. S. (1998). Do international medical graduates reduce rural physician shortages? *Medical Care*, 36(11), 1534-1544.

Ben-David, M. F., Klass, D. J., Boulet, J., De Champlain, A., King, A. M., Pohl, H. S., Gary, N. E. (1999). The performance of foreign medical graduates on the National Board of Medical Examiners (NBME) standardized patient examination prototype: a collaborative study of the NBME and the Educational Commission for Foreign Medical Graduates (ECFMG). *Medical Education*, 33, 439-466.

Blonski, J., Rahm, S. (2003). The relationship of residency performance to match status and US versus international graduate status. *Family Medicine*, 35(2), 100-104.

Braddom, R. L., Crawford, J., DeLisa, J. A., Heilman, D. (1998). Analysis of current practices in recruitment of residents for Physical Medicine and Rehabilitation: survey of PM&R department chairs. *American Journal of Physical Medicine & Rehabilitation*, 77(4), 317-325.

Brook, R. H., Park, R. E., Chassin, M. R., Kosecoff, J., Keesey, J., Soloman, D. H. (1990). Carotid endarterectomy for elderly patients: predicting complications. *Annals of Internal Medicine*, 113(19), 747-753.

Brotherton, S. E., Simon, F. A., Etzel, S. I. (2002). U.S. graduate medical education, 2001-2002. *JAMA*, 288, 1073-1078.

Butter, I. (1971). The migratory flow of doctors to and from the United States. *Medical Care*, 9(1), 17-31.

Cooksey, J. A., Harman, C. P. (1998). Change in GME programs among twelve major specialties. *Academic Medicine*, 73(supplement), S6-S9.

Cooper, R. A., Getzen, T. E., McKee, H. J., Laud, P. (2002). Economic and demographic trends signal an impending physician shortage. *Health Affairs*, 21(1), 140-154.

Deal, W. B. (2000). Nonaccredited medical education in the United States. *New England Journal of Medicine*, 343(15), 1122; author reply 1123.

Donabedian, A. (1988). The quality of care. How can it be assessed? *JAMA*, 260(12), 1743-1748.

Eaton, T. (2001). Cuban hospitality: U.S. minorities take Castro up on offer of free medical school. *Dallas Morning News*, May 14.

Eckhert, N. L. (2002). The global pipeline: too narrow, too wide or just right? *Medical Education*, 36(7), 606-613.

Fairbrother, G., DuMont, K. A., Friedman, S., Lobach, K. S. (1995). New York City physicians serving high volumes of Medicaid children: who are they and wow do they practice? *Inquiry*, 32, 345-352.

Ferguson, B. (2000). Nonaccredited medical education in the United States. *New England Journal of Medicine*, 343(15), 1121-1122; author reply 1123.

Fink, K. S., Phillips, R. L., Jr., Fryer, G. E., Koehn, N. (2003). International medical graduates and the primary care workforce for rural underserved areas. *Health Affairs*, 22(2), 255-262.

Flexner, A. (1910). *Medical education in the US and Canada*. Boston: Merrymount Press.

Geyman, J., Hart, L. G., Norris, T., Coombs, J., Lishner, D. (2000). Educating generalist physicians for rural practice: how are we doing? *Journal of Rural Health*, 16(1), 56-80.

Graduate Medical Education (2002). Appendix II. *JAMA*, 288, 1151-1164.

Greenberg, D. S. (1996). Cut immigration, medical schools say. *Lancet*, 347, 607.

Greenberg, D. S. (2002). New US restrictions on foreign students. *Lancet*, 359(9319), 1757.

Greene, J. (1999). *Is the U.S. training too many physicians?* Available at http://www.ama-assn.org/sci-pubs/amnews/pick_99/anna0614.htm. Accessed October 9, 2003.

Grogono, A. (2001). Residency composition and numbers graduating from residencies in nurse anesthesia schools. *American Society of Anesthesiologists Newsletter*, 65, 19-23.

Grumbach, K. (2002). Fighting hand to hand over physician workforce policy. *Health Affairs*, 21(5), 13-32.

Hagopian, A., Thompson, M. J., Kaltenbach, E., Hart, L. G. (2003). Health departments' use of international medical graduates in physician shortage areas. *Health Affairs*, 22(5), 241-249.

Hagopian, A., Thompson, M. J., Kaltenbach, E., Hart, L. G. (in press). The role of international medical graduates in America's small rural "critical access" hospitals. *Journal of Rural Health*.

Hallock, J. A., Seeling, S. S., Norcini, J. J. (2003). The international medical graduate pipeline. *Health Affairs*, 22(4), 94-96.

Haug, J. N., Stevens, R. (1973). Foreign medical graduates in the United States in 1963 and 1971: a cohort study. *Inquiry*, 10(1), 26-32.

Iglehart, J. K. (1996). Health policy report: the quandary over graduates of foreign medical schools in the United States. *New England Journal of Medicine*, 334(25), 1679-1683.

Jaklevic, M. C. (1997). IMGs (international medical graduates) targeted. Residency slot cuts could hit foreign grads hardest. *Modern Healthcare*, 27(8), 16.

Johnson, K. E., Kaltenbach, E., Hoogstra, K., Thompson, M. J., Hagopian, A., Hart, L. G. (2003). *How international medical graduates enter US graduate medical education*

or employment. Working Paper #76. Seattle, WA: WWAMI Center for Health Workforce Studies, University of Washington.

Kant, J. A. (2001). A tale of two systems: pathology resident recruitment in and out of the National Resident Matching Program. *Human Pathology*, 32, 677-679.

Kassebaum, D. G., Cohen, J. J. (2000). Nonaccredited medical education in the United States. *New England Journal of Medicine*, 342, 1602-1606.

Kindig, D. A., Libby, D. L. (1996). Domestic production vs international immigration: options for the US physician workforce. *JAMA*, 276(12), 978-982.

Koehn, N. N., Fryer, G. E., Phillips, R. L., Miller, J. B., Green, L. A. (2002). The increase in international medical graduates in family practice residency programs. *Family Medicine*, 34, 429-435.

Mick, S. S. (1993). Foreign medical graduates and U.S. physician supply: old issues and new questions. *Health Policy*, 24, 213-225.

Mick, S. S., Comfort, M. E. (1997). The quality of care of international medical graduates: how does it compare to that of U.S. medical graduates? *Medical Care Research and Review*, 54(4), 379-413.

Mick, S. S., Goodman, D. C., Chang, C.-H. (1999). *Medical migration: seasonal or secular*. 4th International Conference on the Medical Workforce, San Francisco, CA.

Mick, S. S., Lee, S.-Y. D. (1997). The safety net role of international medical Ggraduates. *Health Affairs*, 16(4), 141-150.

Mick, S. S., Lee, S.-Y. D. (1999a). Are there need-based geographical differences between international medical graduates and U.S. medical graduates in rural U.S. counties? *Journal of Rural Health*, 15(1), 26-43.

Mick, S. S., Lee, S.-Y. D. (1999b). International and U.S. medical graduates in U.S. cities. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 76(4), 481-496.

Mick, S. S., Lee, S. Y., Wodchis, W. P. (2000). Variations in geographical distribution of foreign and domestically trained physicians in the United States: 'safety nets' or 'surplus exacerbation'? *Social Science and Medicine*, 50(2), 185-202.

Mick, S. S., Pfahler, M. N. (1995). *Review and synthesis of the literature on foreign medical graduates/international medical graduates*. Ann Arbor, MI: Department of Health Management and Policy, School of Public Health, University of Michigan.

Mick, S. S., Rubino., F. (1992). *The 1987 career characteristics of foreign and US medical graduates who entered the US medical system between 1969 and 1982*. Ann Arbor, MI: University of Michigan School of Public Health, Department of Health Services Management and Policy.

Mick, S. S., Sutnik, A. I. (1996). International medical graduates in rural America: the 1987 distribution of physicians who entered the U.S. medical system between 1969 and 1982. *Journal of Rural Health*, 12(5), 423-431.

Mick, S. S., Worobey, J. L. (1984). Foreign and United States medical graduates in practice. A follow-up. *Medical Care*, 22(11), 1014-1025.

Miller, E. A., Laugesen, M. (1998). Emigration of New Zealand and Australian physicians to the United States and the international flow of medical personnel. *Health Policy*, 43, 253-270.

Miller, R., Dunn, M., Richter, T., Whitcomb, M. (1998). Employment-seeking experiences of resident physicians completing training during 1996. *JAMA*, 280(9), 777-783.

Mullan, F. (1995). Medical migration and the physician workforce: international medical graduates and American medicine. *JAMA*, 273(19), 1521-1527.

Mullan, F. (1997). The National Health Service Corps and inner-city hospitals. *Health Affairs*, 336(22), 1601-1604.

Mullan, F. (2000). The case for more US medical students. *New England Journal of Medicine*, 343(3), 213-217.

Mullan, F. (2002). Some thoughts on the White-Follows-Green Law. *Health Affairs*, 21(1), 158-159.

Ozuah, P. O., Curtis, J., Dinkevich, E. (2001). Physical examination skills of US and international medical graduates. *JAMA*, 286(9), 1021.

Peitzman, S. J., Mckinley, D., Curtis, M., Burdick, W., Whelan, G. (2000). Performance of international medical graduates in techniques of physical examination, with a comparison of US citizens and non-US citizens. *Academic Medicine*, 75(10), S115-S117.

Polsky, D., Kletke, P. R., Wozniak, G. D., Escarce, J. J. (2002). Initial practice locations of international medical graduates. *Health Services Research*, 37(4), 907-928.

Pugno, P. A., McPherson, D. S. (2002). The role of international medical graduates in family practice residencies. *Family Medicine*, 34, 468-469.

Pugno, P. A., McPherson, D. S., Schmittling, G. T., Kahn, N. B. J. (2000). Results of the 2000 national resident matching program: family practice. *Family Medicine*, 32, 543-550.

Pugno, P. A., McPherson, D. S., Schmittling, G. T., Kahn, N. B. J. (2001). Results of the 2001 national resident matching program: family practice. *Family Medicine*, 33, 594-601.

Rabinowitz, H., Paynter, N. (2002). The rural vs. urban practice decision. *MSJAMA online*, 287(1), 112.

Rabinowitz, H. K., Paynter, N. P. (2000). The role of the medical school in rural graduate medical education: pipeline or control valve? *Journal of Rural Health*, 16(3), 249-253.

Reinhardt, U. (2002). Dreaming the American dream: once more around on physician workforce policy. *Health Affairs*, 21(5), 28-32.

Riley, J. D., Hannis, M., Rice, K. G. (1996). Are international medical graduates a factor in residency program selection? A survey of fourth-year medical students. *Academic Medicine*, 71(4), 381-386.

Rosenthal, T. C. (2000). Outcomes of rural training tracks: a review. *Journal of Rural Health*, 16(3), 213-216.

Schmidt, B. C., Jr. (2000). Nonaccredited medical education in the United States. *New England Journal of Medicine*, 343(15), 1121; author reply 1123.

Schubert, A., Eckhout, G., Cooperider, T., Kuhel, A. (2001). Evidence of a current and lasting national anesthesia personnel shortfall: scope and implications. *Mayo Clinic Proceedings*, 76, 995-1010.

Stimmel, B. D. (1996). Congress and the International Medical Graduate: the need for equity. *Mount Sinai Journal of Medicine*, 63(5-6), 359-363.

Sullivan, R. B., Watanabe, M., Whitcomb, M., Kindig, D. (1996). The Evolution of divergences in physician supply policy in Canada and the U.S. *JAMA*, 276(9), 704-709.

Thompson, M. J., Hagopian, A., Hart, L. G., Fordyce, M., Johnson, K., et al. (in progress). The role of international medical graduates (IMGs) in rural and urban primary care in the United States.

Tussing, A. D., Wojtowycz, M. A. (1993). The effect of physician characteristics on clinical behavior: cesarean section in New York State. *Social Science and Medicine*, 37(10), 1251-1260.

Waxman, H. S. (1997). Workforce reform, international medical graduates, and the In-training Examination. *Annals of Internal Medicine*, 126, 803-804.

Waxman, H. S., Garibaldi, R. A., Subhiyah, R. (1996). Performances of U.S. and international medical graduates on the 1995 Internal Medicine In-Training Examination. *Annals of Internal Medicine*, 125(2), 158.

Whelan, G., Gary, N. E., Kostis, J., Boulet, J., Hallock, J. A. (2002). The changing pool of international medical graduates seeking certification training in US medical education programs. *JAMA*, 288, 1079-1084.

Whitcomb, M. E., Miller, R. S. (1995). Participation of international medical graduates in graduate medical education and hospital care for the poor. *JAMA*, 274(9), 696-699.

Whitcomb, M. E., Miller, R. S. (1996). Comparison of IMG-dependent and non-IMG dependent residencies in the National Resident Matching Program. *JAMA*, 276(9), 700-703.

Yao, D. C., Wright, S. M. (2000). National survey of internal medicine residency program directors regarding problem residents. *JAMA*, 284(9), 1099-1104.

Young, R., Noble, J., Hann, M., Sibbald, B. (2003). *The international market for medical doctors: perspectives on the positioning of the U.K. Final report*. Manchester, England: Manchester Centre for Health Care Management.

Additional Sources of Reading on IMGs

(2001). Graduate medical education. *JAMA*, 286(9), 1095-1107.

Alibhai, S. M. (1997). Foreign specialists need not apply. *CMAJ*, 157(7), 869-870.

Alwan, A., Hornby, P. (2002). The implications of health sector reform for human resources development. *Bulletin of the World Health Organization*, 80(1), 56-60.

Andrew, R., Bates, J. (2000). Program for licensure for international medical graduates in British Columbia: 7 years' experience. *CMAJ*, 162(6), 801-803.

Aranha, G. V. (1998). The international medical graduate in US academic general surgery. *Archives of Surgery*, 133(2), 130-133.

Aronson, R. D. (2000). National interest waiver eligibility for international medical graduates. *JAMA*, 283(13), 1747.

Arunabh (1989). Foreign medical graduates. *Academic Medicine*, 64(11), 668.

Asante Darko, K. (2002). Pitfalls in the African brain drain discourse. *Mots Pluriels*, 20. Available at http://www.arts.uwa.edu.au/MotsPluriels/MP2002kad.html. Accessed October 23, 2003.

Asper, S. P., Levit, E. J. (1986). Residencies for foreign medical graduates. *New England Journal of Medicine*, 314(20), 1324-1325.

Axinn, G. H. (1997). Collaboration in international rural development: a practitioner's handbook. *Journal of Development Studies*, 20(4), 196-199.

Bagby, R. J. (1996). More IMG involvement needed. *Journal of the Florida Medical Association*, 83(8), 533-534.

Balon, R., Munoz, R. A. (1996). International medical graduates in psychiatric manpower calculations. *American Journal of Psychiatry*, 153(2), 296.

Barnett, J. R. (1991). Geographical implications of restricting foreign medical immigration: a New Zealand case study, 1976-87. *Social Science and Medicine*, 33(4), 459-470.

Baskey, G. (2001). Saskatchewan hopes to ease MD shortage by easing licensing requirements. *JAMC*, 164(9), 1336.

Bates, J., Andrew, R. (2001). Untangling the roots of some IMG's poor academic performance. *Academic Medicine*, 76(1), 43-46.

Beine, M. D., Rapoport, F. (2001). Brain drain and economic growth: theory and evidence. *Journal of Developmental Economics*, 64, 275-289.

Bergen, S. S., Lenoble, B. (1976). Foreign medical graduates. *Archives of Internal Medicine*, 136, 1194.

Blair, L. (1994). Foreign doctors. Wasted resources? *Canadian Family Physician*, 40, 831-834.

Boba, A. (1998). International medical graduates. *Archives of Surgery*, 133, 1369.

Bouvier, L., Jenks, R. (1998). *Doctors and nurses: a demographic profile*. Available at http://www.cis.org/articles/1998/DocsandNurses.html. Accessed October 16, 2003.

Bradley, W. G. (1996). Graduates of foreign medical schools in the United States. *New England Journal of Medicine*, 335(20), 1535-1536; author reply 1536-1537.

Brotherton, S. E., Simon, F. A., Etzel, S. I. (2001). US graduate medical education, 2000-2001. *JAMA*, 286(9), 1056-1060.

Brotherton, S. E., Simon, F. A., Tomany, S. C. (2000). US graduate medical education, 1999-2000. *JAMA*, 284(9), 1121-1126.

Buchan, J. (2002). Global nursing shortages: are often a symptom of a wider health system of societal ailments. *BMJ*, 324, 751-752.

Buff, D. D. (1997). I'll never look down on IMGs again. *Medical Economics*, 74(11), 172-173, 176.

Bundred, P. E., Levitt, C. (2000). Medical migration: who are the real losers? *Lancet*, 356(9225), 245-246.

Burnett, W. H., Mark, D. H., Midtling, J. E., Zellner, B. B. (1995). Primary care physicians in underserved areas family physicians dominate. *Western Journal of Medicine*, 163, 532-536.

Bushee, G. R., Sunshine, J. H., Schepps, B. (2000). The status of diagnostic radiology training programs and their graduates in 1999. *American Journal of Roentgenology*, 175, 963-966.

Buske, L. (2000). Trainees sponsored by foreign governments fill growing share of residency slots. *CMAJ*, 163(9), 1185.

Carlson, B. (2001). *CMA balks as California eyes Mexico to recruit docs to serve Latinos*. Available at http://www.managedcaremag.com/archives/0111/0111.states.html. Accessed October 15, 2003.

Chandra, M. (1996). Graduates of foreign medical schools in the United States. *New England Journal of Medicine*, 335(20), 1536; author reply 1536-1537.

Chang, S., et al. (1999). *Medical migration: seasonal or secular*. 4th International Conference on the Medical Workforce, San Francisco, CA.

Cohen, J. J., Whitcomb, M. E. (1997). Are the recommendations of the AAMC's task force on the generalist physician still valid? *Academic Medicine*, 72(1), 13-16.

Coll, P. P. (1995). International medical graduates series inspires readers' comments. *Family Medicine*, 27(4), 227; author reply 228-229.

Conn, H. L., Jr. (1986). Assessing the clinical skills of foreign medical graduates. *Journal of Medical Education*, 61(11), 863-871.

Connor, R. A., Hillson, S. D., Krawelski, J. E. (1995). Competition, professional synergism, and the geographic distribution of rural physicians. *Medical Care*, 33(11), 1067-1078.

Cooper, R. A., Getzen, T. E. (2002). The coming physician shortage. *Health Affairs*, 21(2), 296-299.

Crewson, P. E., Sunshine, J. H., Schepps, B. (1998). The situation of diagnostic radiology training programs and their graduates in 1997. *American Journal of Roentgenology*, 171, 919-922.

Davidson, H. (1999). South African saga continues. *Canadian Family Physician*, 45, 2586.

Diaz-Briquets, S., Perez-Lopez, J. (1997). Refugee remittances: conceptual issues and the Cuban and Nicaraguan experiences. *International Migration Review*, 31(2), 411-437.

Donen, N., King, F., Reid, D., Blackstock, D. (1999). Canadian anesthesia physician resources: 1996 and beyond. *Canadian Journal of Anesthesia*, 46(10), 962-969.

Editor (1997). *Land of (too much) opportunity*. Available at http://www.ama-assn.org/sci-pubs/amnews/amn_97/edit0324.htm. Accessed October 14, 2003.

Ehman, A. J., Sullivan, P. (2001). South Africa appeals to Canada to stop recruiting its MDs. *CMAJ*, 164(3), 387-388.

Ellis, F. (2000). Rural livelihoods and diversity in developing countries. *Journal of Development Studies*, 20(4), 168-171.

Emson, H. E. (1998). A GOFM and damn proud of it! *CMAJ*, 158(6), 713-714.

Evangelista, D. R. M. (2000). Attitudinal problems facing international medical graduates. *CMAJ*, 163(6), 697.

Foulkes, M., Newbold, B. k. (2000). Migration propensities, patterns and the role of human capital: comparing Mexican, Cuban, and Puerto Rican interstate migration, 1985-1990. *Professional Geographer*, 52(1), 133-145.

Fowkes, V., Cawley, J. F., Herlihy, N., Cuadrado, R. R. (1996). Evaluating the potential of international medical graduates as physician assistants in primary care. *Academic Medicine*, 71(8), 886-892.

Frenk, J., Freeman, P. (1994). Consequences of the North American Free Trade Agreement for health services: a perspective from Mexico. *American Journal of Public Health*, 84(10), 1591-1597.

Frenzen, P. D. (1991). The increasing supply of physicians in US urban and rural areas, 1975 to 1988. *American Journal of Public Health*, 81(9), 1141-1147.

Gani, A., Ward, B. D. (1995). Migration of professionals from Fiji to New Zealand: a reduced form supply-demand model. *World Development*, 23(9), 1633-1637.

Gessert, C., Blossom, J., Sommers, P., Canfield, M. D., Jones, C. (1989). Family physicians for underserved areas: the role of residency training. *Western Journal of Medicine*, 150, 226-230.

Gish, O. (1971). *Doctor migration and world health: the impact of the international demand for doctors on health services in developing countries.* Occasional Papers on Social Administration No. 43. London: G. Bell and Sons.

Gish, O. (1971). The impact of the international demand for doctors on health services in developing countries. In R. M. Titmus (Ed.), *Doctor migration and world health*. London: G. Bell and Sons.

Gish, O. (1973). Doctor auxiliaries in Tanzania. *Lancet*, 2(7840), 1251-1254.

Gish, O. (1973). Resource allocation, equality of access, and health. *International Journal of Health Services*, 3(3), 399-411.

Gish, O. (1979). The political economy of primary care and health by the people: an historical exploration. *Journal Of Science and Medicine*, 130, 203-211.

Gish, O., Godfrey, M. (1979). A reappraisal of the "brain drain"—with special reference to the medical profession. *Social Science and Medicine*, 13C, 1-11.

Goldsmith, L. J., Ricketts, T. C. (1999). Proposed changes to designations of medically underserved populations and health professional shortage areas: effects on rural areas. *Journal of Rural Health*, 15(1), 44-54.

Gray, C. (1999). How bad is the brain drain? *JAMC*, 161(8), 1028-1029.

Grumbach, K. (2002). The ramifications of specialty-dominated medicine. *Health Affairs*, 21(1), 155-157.

Grumbach, K., Becker, S. H., Osborn, E. H. S., Bindman, A. B. (1995). The challenge of defining and counting generalist physicians: an analysis of Physician Masterfile data. *American Journal of Public Health*, 85(10), 1402-1407.

Hayes-Baustina, D. E., Hsu, P., Hayes-Baustina, M., Stein, R. M., Dowling, P., Beltran, R., Villagomez, J. (2000). Latino physician supply in California: sources, locations, and projections. *Academic Medicine*, 75(7), 727-736.

Hentschel (1999). Contextuality and data collection methods: a framework and application to health service utilisation. *Journal of Development Studies*, 35(4), 64-94.

Horner, S. (1996). Brain drain: colossal loss of investments for developing countries. *Courier*, 159(Sept-Oct), 59-60.

Iredale, R. (1999). The need to import skilled personnel: factors favouring and hindering its international mobility. *International Migration Review*, 37(1), 90-120.

Iredale, R. (2000). Migration policies for the highly skilled in the Asia-Pacific region. *International Migration Review*, 34(3), 882.

Iredale, R. (2001). The migration of professional theories and typologies. *International Journal of Health Services*, 39(5), 9-21.

Jaklevic, M. C. (1996). HUD halts its foreign-doc visa program. *Modern Healthcare*, 26(52), 3.

Jiang, H. J., Begun, J. W. (2002). Dynamics of change in local physician supply: an ecological perspective. *Social Science and Medicine*, 2002(54), 1525-1541.

Johnson, D. G., Swanson, A. G., Jolly, P., Teich, J., Asper, S. P. (1986). United States citizens studying medicine abroad. Their backgrounds and test performance. *New England Journal of Medicine*, 315(24), 1525-1532.

Kahn, N. B., Jr., Schmittling, G. T., Garner, J. G., Graham, R. (1996). Entry of US medical school graduates into family practice residencies: 1995-1996 and 3-year summary. *Family Medicine*, 28(8), 539-547.

Kent, H. (2000). College to appeal discrimination ruling. *JAMC*, 162(6), 854.

Kerr, C. P. (1993). Recruiting international medical school graduates. *Family Medicine*, 25(4), 227-228.

Kindig, D. A., Movassaghi, H. (1989). The adequacy of physician supply in small rural counties. *Health Affairs*, 8(2), 63-76.

Logan, B. I. (1999). The reverse transfer of technology from Sub-Saharan Africa: the case of Zimbabwe. *International Journal of Health Services*, 37(2), 438-462.

Lostumbo, E. M., Beran, R. L. (1999). Results of the National Resident Matching Program for 1999. *Academic Medicine*, 74(6), 722-724.

Lostumbo, E. M., Beran, R. L. (2001). Results of the National Resident Matching Program for 2001. *Academic Medicine*, 76(6), 665-668.

Lucas, R. E. B., Stark, O. (1985). Motivations to remit: evidence from Botswana. *Journal of Political Economy*, 93(5), 901-910.

MacLachlan, T. B. (2000). Licensing international medical graduates. *CMAJ*, 163(3), 260-261.

Mahroum, S. (2000). Highly skilled globetrotters: mapping the international migration of human capital. *R&D Management*, 30(1), 23-31.

Majumdar, B., Keystone, J. S., Cuttress, L. A. (1999). Cultural sensitivity among foreign medical graduates. *Medical Education*, 33, 177-184.

Marer, M. L., Webber, W. A. (1999). *Immigration and emigration of physicians to/from Canada*. San Francisco: Quadrilateral Physician Workforce.

Martin, K. E. (2000). A rural-urban comparison of patterns of physician assistant practice. *JAAPA*, 13(7), 49-50, 56, 59 passim.

Martini, C. J. (1987). The international responsibilities of American medical education. *JAMA*, 257(19), 2630-2631.

Massey, D. S., Taylor, J. E. (1993). Theories of international migration: a review and appraisal. *Population and Development Review*, 19(3), 431-440.

McCaffrey, M. (1998). No more Band-Aid solutions for rural medicine. *CMAJ*, 159(7), 761.

McGirr, J., Williams, J. M., Prescott, J. E. (1998). Physicians in rural West Virginia emergency departments: residency training and board certification status. *Academic Emergency Medicine*, 5, 333-336.

Mejia, A., Pizurki, H., Royston, E. (1979). *Physician and nurse migration: analysis and policy implications*. France: World Health Organization.

Memon, M. A., Memon, B. (1998). The international medical graduate in US academic general surgery: is the truth out? *Archives of Surgery*, 133(7), 781-782.

Meyer, J.-B. (2001). Network approach versus brain drain: lessons from the diaspora. *International Migration Review*, 39(5), 92-105.

Mick, S. S., Stevens, R. A., Goodman, L. W. (1976). United States foreign medical graduates in Connecticut: how they compare with foreign medical graduates. *Medical Care*, 14(6), 489-501.

Mick, S. S., Sutnik, A. I. (1997). Women in US medicine: the comparative roles of graduates of US and foreign medical schools. *Journal of the American Medical Women's Association*, 52(3), 152-158.

Mick, S. S., Worobey, J. L. (1986). The future role of foreign medical graduates in U.S. medical practice: projections into the 1990s. *Health Services Research*, 21(1), 85-106.

Miller, R. S., Jonas, H. S., Whitcomb, M. E. (1996). The initial employment status of physicians completing training in 1994. *JAMA*, 275(9), 708-712.

Morrill, R., Cromartie, J., Hart, G. (1999). Metropolitan, urban, and rural commuting areas: toward a better depiction of the United States settlement system. *Urban Geography*, 20(8), 727-748.

Mullan, F. (1996). Graduate medical education and water in the soup. *New England Journal of Medicine*, 334(14), 916-917.

Myers, C. (1995). Different paths, same goal. International medical graduates struggle with licensure hurdles, discrimination. *Texas Medicine*, 91(2), 30-32.

Mylonakis, E., Mega, A., Schiffman, F. J. (1999). What do program directors in internal medicine think about international medical graduates? Results of a pilot study. *Academic Medicine*, 74(4), 452.

Nasir, L. S. (1994). Evidence of discrimination against international medical graduates applying to family practice residency programs. *Family Medicine*, 26, 625-629.

Nasmith, L. (2000). License requirements for international medical graduates: should national standards be adopted? *CMAJ*, 162(6), 795-796.

Norris, T. E. (2000). Education for rural practice: a saga of pipelines and plumbers. *Journal of Rural Health*, 16(3), 208-212.

Olchanski, V., Marsland, D., Rossiter, L., Johnson, R. (1998). Behind the physician licensure numbers: false impressions, retirement crisis, and migration. *Clinical Performance and Quality Health Care*, 6(3), 142-146.

Olfson, M., Marcus, S. C., Pincus, H. A. (2000). Dr. Olfson and colleagues reply. *American Journal of Psychiatry*, 157(3), 485.

Omoigui, N. A. (1991). Clinical skills of foreign medical graduates. *Annals of Internal Medicine*, 115(2), 158.

Osteen, A. (1991). Licensure and international medical graduates. *JAMA*, 266(7), 956-958.

Pang, T. (2002). Brain drain and health professionals: a global problem needs global solutions. *BMJ*, 324, 499-500.

Pathman, D. E., Konrad, T. R. (1996). Minority physicians serving in rural National Health Service Corps sites. *Medical Care*, 34(5), 439-454.

Pathman, D. E., Riggins, T. A. (1996). Promoting medical careers in underserved areas through training. *Family Medicine*, 28(7), 508-510.

Pathman, D. E., Williams, E. S., Konrad, T. R. (1996). Rural physician satisfaction: its sources and relationship to retention. *Journal of Rural Health*, 12(5), 366-377.

Pedraza, S. (1991). Women and migration: the social consequences of gender. *Annual Review of Sociology*, 17, 303-325.

Pellegrino, A. (2001). Trends in Latin American skilled migration: "brain drain" or "brain exchange"? *International Migration Review*, 39(5), 112-130.

Politzer, R. M., Cultice, J. M., Meltzer, A. J. (1998). The geographic distribution of physicians in the United States and the contribution of international medical graduates. *Medical Care Research and Review*, 55(1), 116-130.

Politzer, R. M., Yesalis, C. E., Katzoff, J. M. (1989). The hidden future supply of foreign medical graduates. *Medical Care*, 27(11), 1046-1057.

Porzecanski, I., Deeby, M., Wynd, K., Jeewa, A., Bengough, M., Esperanzate, P., Jibodh, S. (2000). A homegrown solution, via Ireland. *CMAJ*, 162(6), 753.

Rabinowitz, H. (1995). Recruitment and retention of rural physicians: how much progress have we made? *Journal of the American Board of Family Practice*, 8(6), 496-499.

Rabinowitz, H. K. (1988). Evaluation of a selective medical school admissions policy to increase the number of family physicians in rural and underserved areas. *New England Journal of Medicine*, 319(8), 480-486.

Rabinowitz, H. K. (1993). Recruitment, retention, and follow-up of graduates of a program to increase the number of family physicians in rural and underserved areas. *New England Journal of Medicine*, 328(13), 934-939.

Rabinowitz, H. K., Diamond, J. J., Hojat, M., Hazelwood, C. E. (1999). Demographic, educational and economic factors related to recruitment and retention of physicians in rural Pennsylvania. *Journal of Rural Health*, 15(2), 212-218.

Rabinowitz, H. K., Diamond, J. J., Markham, F. W., Hazelwood, C. E. (1999). A program to increase the number of family physicians in rural and underserved areas: impact after 22 years. *JAMA*, 281(3), 255-260.

Rabinowitz, H. K., Diamond, J. J., Markham, F. W., Paynter, N. P. (2001). Critical factors for designing programs to increase the supply and retention of rural primary care physicians. *JAMA*, 286(9), 1041-1048.

Ravenstein, E. G. (1889). Laws of migration. *Journal of the Statistical Society of London*, 48(2), 167-235.

Romano, M. (2001). Physicians targeted. Some docs of Mideast descent attacked, suspended; group decries 'backlash'. *Modern Healthcare*, 31(39), 14.

Rothman, A. I., Cusimano, M. (2001). Assessment of English proficiency in international medical graduates by physician examiners and standardized patients. *Medical Education*, 35, 762-766.

Salsberg, E. (2000). The posttraining plans of international medical graduates and US medical graduates in New York State. *JAMA*, 283(13), 1749-1750.

Salsberg, E. S., Forte, G. J. (2002). Trends in the physician workforce, 1980-2000. *Health Affairs*, 21(5), 165-173.

Salvadori, G. V. (2000). Are physicians treated equally? *Canadian Family Physician*, 46, 528-529.

Scammon, D. L., Williams, S. D., Li, L. B. (1994). Understanding physicians' decisions to practice in rural areas as a basis for developing recruitment and retention strategies. *Journal of Ambulatory Care Marketing*, 5(2), 85-100.

Schroeder, K. M. (1998). Eliminate the J-1 visa waiver program. *Texas Medicine*, 94(12), 9.

Shinkman, R. (1998). Satellite heads for Wyoming. Foreign med school plans to expand despite protests. *Modern Healthcare*, 28(42), 22.

Shuggi, E. (1996). Room for international medical graduates. *Postgraduate Medicine*, 100(6), 39.

Singer, J. (1992). Licensing of international medical graduates. *JAMA*, 267(1), 53-54.

Smith, D. P. (2001). Physician workforce debate continues. *Postgraduate Medicine*, 109(6), 31.

Smith, L. G. (1996). More on "rightsizing residencies." *Academic Medicine*, 71(11), 1135.

Smith, W. L. (1995). Radiology resident notes. *Academic Radiology*, 2, 275.

Stalker, P. (2000). Workers without frontiers: the impact of globalization on international migration. London and Boulder, CO: Lynne Riener.

Stearns, J. A., Glasser, M., Fulkerson, P. (1997). Medical student education: an admission and curricular approach to rural physician shortages. *Academic Medicine*, 72(5), 438-439.

Stevens, R. A. (1995). International medical education and the concept of quality: historical reflections. *Academic Medicine*, 70(7), S11-S18.

Sutnick, A. I. (1970). First symposium on the problems of foreign medical graduates. *JAMA*, 213(13), 2241-2246.

Swanson, A. G. (1986). The clinical skills of foreign medical graduates. *Journal of Medical Education*, 61(11), 932.

Tanchanco, R. C. (2001). The frantic job search of an IMG. *Medical Economics*, 78(1), 67.

Tetty, W. J. (2002). Africa's brain drain: exploring possibilities for its positive utilization through networked communities. *Mots Pluriels*, 20. Available at http://www.arts.uwa.edu.au/MotsPluriels/MP2002wjt.html. Accessed October 23, 2003.

Tulgan, H., Butorac, M., McCue, J. D. (1997). IMG applicants to a medical residency program. *Academic Medicine*, 72(8), 659-660.

US General Accounting Office (1996). *Foreign Physicians Exchange Visitor Program becoming major route to practicing in US underserved areas.* Report to Congressional Committees.

Villalobos, R. (1976). Comment on foreign medical graduates. *Archives of Internal Medicine*, 136, 1194.

Weiner, J. P. (2002). A shortage of physicians or a surplus of assumptions? *Health Affairs*, 21(1), 160-162.

Whelan, G. (2000). High-stakes medical performance testing: the Clinical Skills Assessment Program. *JAMA*, 283(13), 1784.

White, O. (1993). This could end the rural doctor shortage. *Medical Economics*, 70(23), 42-44, 47-49.

Wojtczak, A., Schwarz, M. R. (2000). Minimum essential requirements and standards in medical education. *Medical Teacher*, 22(6), 555-559.

Wollschlaeger, B. (1996). Graduates of foreign medical schools in the United States. *New England Journal of Medicine*, 335(20), 1536; author reply 1536-1537.

Wong, K.-Y., Yip, C. K. (1999). Education, economic growth, and brain drain. *Journal of Economic Dynamics and Control*, 23, 699-726.

Worobey, J. L., Mick, S. S. (1987). How sex and country of medical education affect FMG specialty choice. *Journal of the American Medical Women's Association*, 42(3), 85-89.

Xu, G., Veloski, J. J., Hojat, M., Politzer, R. M., Rabinowitz, H. K., Rattner, S. (1997). Factors influencing physicians' choices to practice in inner-city or rural areas. *Academic Medicine*, 72(12), 1026.

Young, D. M., Bernstein, D. (1996). Shrinking the western Pacific: psychiatric training for medical students from Micronesia. *Hawaii Medical Journal*, 55(4), 70-71.

Additional Sources on Legal Aspects of Immigration

American Medical Association (2002). *ECFMG certification information.* Available at http://www.ama-assn.org/ama/pub/printcat/1552.html. Accessed November 8, 2002.

American Medical Association (2002). *Immigration information for IMGs.* Available at http://www.ama-assn.org/ama/pub/category/1553.html. Accessed November 8, 2002.

American Medical Association (2002). *State licensure board requirements for IMG.* Available at http://www.ama-assn.org/ama/pub/printcat/1555.html. Accessed November 8, 2002.

Allen C. Ladd Immigration Law Office, P.C. *US immigration law: foreign physicians, American sponsors.* Available at http:www.medzilla.com/allenladd-1.html. Accessed November 8, 2002.

American College of Physicians-American Society of Internal Medicine Online. *International medical graduates-immigration law & international medical graduates.* Available at http://www.acponline.org/img/jafri.htm. Accessed November 8, 2002.

Diffenbaugh & Associates, Inc. Options for foreign national physicians. Available at http:www.diffenbaughassociates.com/pages/immigration.html#H-!B_Visa. Accessed November 8, 2002.

Educational Commission for Foreign Medical Graduates. Available at http://www.ecfmg.org/index.html. Accessed November 8, 2002.

Immigration & Naturalization Service. *Immigration under the National Interest Waiver for Physicians in Underserved Areas.* Available at http:www.ins.usdoj.gov/graphics/services/residency/PhysWaiver.htm. Accessed November 8, 2002.

Ingber & Aronson, Immigration & Nationality Lawyers. *The American immigration system: an overview of requirements and general information.* Available at http://www.ingber-aronson.com/publications/overview.html. Accessed November 8, 2002.

US Department of State, Bureau of Consular Affairs. Available at http://travel.state.gov. Accessed November 8, 2002.

US Department of Agriculture. *USDA fact sheet.* Release No. fsj-1fisa.02. Available at http://www.usda.gov/news/releases/2002/03/fsj1visa.htm. Accessed November 18, 2002.

Appendices

Table 1: Timeline of Key IMG-Related Policies

1933-1948	European IMGs immigrate as refugees in relatively small numbers.
1948	Exchange visitor program lets IMGs train in U.S. Many stay.
1956	AMA and others create IMG-certification system, the ECFMG.
1965	Immigration Act of 1965 loosens immigration quotas based on national origin, particularly for physicians, increasing the number of IMGs.
1971	IMGs get quicker job clearances for permanent residency status.
1972	Department of State restricts occupations eligible for the J visa and requires J-visa recipients to return home for two years following completion of training.
1976	Congress raises immigration barriers against IMGs fearing impending physician surplus; inflow of new IMGs decreases and then levels off in 1980s.
1980	Federal study recommends IMG limits.
1985	Federal legislation proposed to cut off GME funding for IMGs. Fails.
1990	Immigration Act of 1990 excuses physicians working in the "national interest" from traditional certification requirements of application for permanent residency.
1996	President Clinton signs the Illegal Immigration Reform and Immigrant Responsibility Act into law in 1996.
1998	Growing pattern of denials of national interest waivers for foreign physicians.
1999	November 12, 1999, President approves enactment of the Nursing Relief for Disadvantaged Areas Act of 1999, Public Law 106-95 (Nursing Relief Act); national service role of physicians working in MUAs reaffirmed.
2000	September 6, 2000, INS releases final rule on matter of immigration under the National Interest Waiver for Physicians in Underserved Areas.
2001	USDA withdraws from J-1 Visa Waiver Program as an interested government agency (IGA).
2002?	HHS expands its role as an IGA to physicians.
2003	Delta Regional Commission announces it will serve as an IGA.

Sources: AMA, 1999; Polsky et al., 2002; Mick & Pfahler, 1995.

Table 2: Important Events in the J-1 Waiver Program

1994	USDA becomes an IGA
1994	Conrad State 20 program enacted by Immigration and Technical Corrections Act of 1994
1996	President Clinton signs into law Illegal Immigration Reform and Immigrant Responsibility Act of 1996, which includes several J-1 waiver program changes.
December 13, 1996	HUD permanently withdraws from program
May 28, 1997	USIA enacts new rules to create uniformity among interested government agency (IGA) sponsorship procedures
September 1999	USIA folds into State Department
2001	USDA withdraws from J-1 Visa Waiver Program as an IGA
October 2002	Congress passes Department of Justice Authorization bill which reauthorizes Conrad State 20 program
December 2002	HHS announces it will serve as an IGA for the J-1 Visa Waiver Program (previously restricted to researchers)

Figure 1: Summary of Temporary Visa Types

Type	Length	Patient Care	Special Requirements to Transfer to Different Visa
J-1 (Exchange Visitor)	Length of training	Yes	2-year home visit or waiver
H-1B (Temporary Worker)	3 years, with 3 year extension possible	Yes, if appropriately certified	With J-1 Visa Waiver from Interested Government Agency or state health department, must wait three years
O-1 (Alien with Extraordinary Ability)	2 years, with annual renewal thereafter; no statutory limit	Yes	None (unless previously subject to 2-year residency requirement)
TN (Professionals Under the North American Free Trade Agreement)	Indefinite	Only if incidental to teaching or conducting research	None
Available, but rarely used			
B-1 (Visitor for Business)	Up to 1 year	No	None
F-1 (Academic studies)	Course of training	No	None
L (Intracompany transferees)	Initially 3 years; up to 5 years for specialized knowledge employees and up to 7 years for managers and executives	Yes	None

Previous WWAMI Center for Health Workforce Studies and Rural Health Research Center Working Papers

The WWAMI Rural Health Research Center was established in 1988. The WWAMI Center for Health Workforce Studies was established in 1998.

1. Hart, L. Gary; Rosenblatt, Roger A.; and Amundson, Bruce A. Is There a Role for the Small Rural Hospital? January 1989.
2. Hart, L. Gary; Rosenblatt, Roger A.; and Amundson, Bruce A. Rural Hospital Utilization: Who Stays and Who Goes? March 1989.
3. Amundson, Bruce A. and Hughes, Robert D. Are Dollars Really the Issue for the Survival of Rural Health Services? June 1989.
4. Nesbitt, Thomas S.; Rosenblatt, Roger A.; Connell, Frederick A.; and Hart, L. Gary. Access to Obstetrical Care in Rural Areas: Effect on Birth Outcomes. July 1989.
5. Schleuning, Dianne; Rice, George; and Rosenblatt, Roger A. Addressing Barriers to Rural Perinatal Care: A Case Study of the Access to Maternity Care Committee in Washington State. October 1989.
6. Rosenblatt, Roger A.; Whelan, Amanda; and Hart, L. Gary. Rural Obstetrical Access in Washington State: Have We Attained Equilibrium? January 1990.
7. Rosenblatt, Roger A; Weitkamp, Gretchen; Lloyd, Michael; Schafer, Bruce; Winterscheid, Loren C.; Vaughn, J. Daniel; and Hart, L. Gary. Are Rural Family Physicians Less Likely to Stop Practicing Obstetrics Than Their Urban Counterparts: The Impact of Malpractice Claims. April 1990.
8. Rosenblatt, Roger A.; Whelan, Amanda; Hart, L. Gary, Long, Constance; Baldwin, Laura-Mae; and Bovbjerg, Randall R. Tort Reform and the Obstetric Access Crisis: The Case of the WAMI States. June 1990.
9. Hart, L. Gary; Pirani, Michael; and Rosenblatt, Roger A. Causes and Consequences of Rural Small Hospital Closures from the Perspectives of Mayors. September 1990.
10. Welch, H. Gilbert; Larson, Eric H.; Hart, L. Gary; and Rosenblatt, Roger A. Readmission Following Surgery in Washington State Rural Hospitals. January 1991.
11. Amundson, Bruce A.; Hagopian, Amy; and Robertson, Deborah G. Implementing a Community-Based Approach to Strengthening Rural Health Services: The Community Health Services Development Model. February 1991.
12. Hoare, Geoffrey; Katz, Aaron; Porter, Alice; Dannenbaum, Alex; and Baldwin, Harry. Rural Health Care Linkages in the Northwest. April 1991.
13. Whitcomb, Michael E.; Cullen, Thomas J.; Hart, L. Gary; Lishner, Denise M.; and Rosenblatt, Roger A. Impact of Federal Funding for Primary Care Medical Education on Medical Student Specialty Choices and Practice Locations (1976-1985). April 1991.
14. Larson, Eric H.; Hart, L. Gary; and Rosenblatt, Roger A. Is Rural Residence Associated with Poor Birth Outcome? June 1991.
15. Williamson, Harold A.; Rosenblatt, Roger A.; Hart, L. Gary. Physician Staffing of Small Rural Hospital Emergency Departments: Rapid Change and Escalating Cost. September 1991.
16. Hart, L. Gary; Pirani, Michael J.; Rosenblatt, Roger A. Rural Hospital Closure and Local Physician Supply: A National Study. December 1991.
17. Larson, Eric H.; Hart, L. Gary; Hummel, Jeffrey. Rural Physician Assistants: Results from a Survey of Graduates of MEDEX Northwest. May 1992.
18. Hart, L. Gary; Robertson, Deborah G.; Lishner, Denise M; Rosenblatt, Roger A. Part 1: CEO Turnover in Rural WAMI Hospitals. Part 2: Rural Versus Urban CEOs: A Brief Report on Education and Career Location Patterns. August 1992.
19. Williamson, Harold; Hart, L. Gary; Pirani, Michael J.; Rosenblatt, Roger A. Rural Hospital Surgical Volume: Cutting Edge Service or Operating on the Margin? January 1993.
20. Rosenblatt, Roger A.; Saunders, Greg; Tressler, Carolyn; Larson, Eric H.; Nesbitt, Thomas S.; Hart, L. Gary. Do Rural Hospitals Have Less Obstetric Technology than their Urban Counterparts? A Statewide Study. March 1993.
21. Williamson, Harold A.; Hart, L. Gary; Pirani, Michael J.; Rosenblatt, Roger A. Market Shares for Rural Inpatient Surgical Services: Where Does the Buck Stop? April 1993.
22. Geyman, John P.; Hart, L. Gary. Primary Care at a Crossroads: Progress, Problems and Policy Options. May 1993.

23. Nesbitt, Thomas S.; Larson, Eric H.; Rosenblatt, Roger A.; Hart, L. Gary. Local Access to Obstetric Care in Rural Areas: Effect on Prenatal Care, Birth Outcomes, and Costs. August 1993.
24. Grossman, David; Hart, L. Gary; Rivara, Frederick P.; Rosenblatt, Roger A.; Maier, Ronald V. From Roadside to Bedside: The Regionalization of Motor Vehicle Trauma Care in a Remote Rural County. October 1993.
25. Baldwin, Laura-Mae; Hart, L. Gary; West, Peter A.; Norris, Tom E.; Gore, Edmond. Two Decades of Experience in the University of Washington Family Medicine Residency Network: Practice Differences Between Graduates in Rural and Urban Locations. November 1993.
26. Statewide Office of Rural Health and Washington Rural Health Association. Implementing Health Care Reform: Setting a Course for Rural Washington. Summary of a Workshop, November 9-10, 1993, Seattle, Washington. January 1994.
27. Williamson, Harold A.; West, Peter A.; Hagopian, Amy. Scope of Rural Medical Services: A Workbook for Hospital Trustees. March 1994.
28. Cullen, Thomas J.; Hart, L. Gary; Whitcomb, Michael E.; Lishner, Denise M.; Rosenblatt, Roger A. The National Health Service Corps: Rural Physician Service and Retention. September 1994.
29. Neighbor, William E.; Baldwin, Laura-Mae; West, Peter A.; Bezy, Judith M.; Hart, L. Gary. Experience of Rural Hospitals with the National Practitioner Data Bank. October 1994.
30. Rosenblatt, Roger A.; Mattis, Rick; Hart, L. Gary. Access to Legal Abortions in Rural America: A Study of Rural Physicians in Idaho. November 1994.
31. West, Peter A.; Norris, Thomas E.; Gore, Edmond J.; Baldwin, Laura-Mae; Hart, L. Gary. The Geographic and Temporal Patterns of Residency-Trained Family Physicians: University of Washington Family Practice Residency Network. February 1995.
32. Hart, L. Gary; Dobie, Sharon A.; Baldwin, Laura-Mae; Pirani, Michael J.; Fordyce, Meredith; Rosenblatt, Roger A. Rural and Urban Differences in Physician Resource Use for Low-Risk Obstetrics. March 1995.
33. Rosenblatt, Roger A.; Saunders, Greg; Shreffler, Jean; Pirani, Michael J.; Larson, Eric H.; Hart, L. Gary. Beyond Retention: National Health Service Corps Participation and Subsequent Practice Locations of a Cohort of Rural Family Physicians. April 1995.
34. Dobie, Sharon; Hart, L. Gary; Fordyce, Meredith; Andrilla, Holly; Rosenblatt, Roger A. Content of Obstetric Care for Rural, Medicaid, and Minority Women. June 1995.
35. Melzer, Sanford M.; Grossman, David C.; Hart, L. Gary; Rosenblatt, Roger A. Hospital Services for Rural Children in Washington State: Where Do They Go for Care and Who Takes Care of Them? October 1995.
36. Larson, Eric H.; Hart, L. Gary; Rosenblatt, Roger A. Is Rural Residence a Risk Factor for Poor Birth Outcome? A National Study. December 1995.
37. Norris, Thomas E.; Reese, Jennifer W.; Rosenblatt, Roger A. Are Rural Family Physicians Comfortable Performing Cesarean Sections? March 1996.
38. Lishner, Denise M.; Richardson, Mary; Levine, Phyllis, Patrick Donald. Access to Primary Health Care Among Persons with Disabilities in Rural Areas: A Summary of the Literature. April 1996.
39. Dunbar, Peter J.; Mayer, Jonathan D.; Fordyce, Meredith A.; Lishner, Denise M.; Hagopian, Amy; Spanton, Ken; Hart, L. Gary. A Profile of Anesthesia Provision in Rural Washington and Montana. May 1996.
40. Perrin, Edward B.; Hart, L. Gary;, Goldberg, Bruce; Grossman, David; Skillman, Susan M.; Paul, Britt. Patient Outcomes and Medical Effectiveness Research in Rural Areas for Racial/Ethnic Populations: Issues and Recommendations. July 1996.
41. Perrin, Edward B.; Hart, L. Gary; Skillman, Susan M.; Paul, Britt; Hanken, Mary Alice; Hummel, Jeffrey. Health Information Systems and Their Role in Rural Health Services: Issues and Policy Recommendations. August 1996.
42. Saver, Barry; Casey, Susan; House, Peter; Lishner, Denise; Hart, Gary. Antitrust and Action Immunity in Rural Washington State. Part I: User's Guide to Antitrust and Rural Health Care Environments. Part II: Antitrust Issues in Rural Washington State. January 1997.
43. Dyck, Sarah; Hagopian, Amy; House, Peter J.; Hart, L. Gary. Northwest Rural Hospital Governing Boards. November 1997.
44. Doescher, Mark P.; Ellsbury, Kathleen E.; Hart, L. Gary. The Distribution of Rural Female Generalist Physicians in the United States. February 1998.
45. Wright, George E.; Andrilla, C. Holly A. How Many Physicians Can a Rural Community Support? A Practice Income Potential Model for Washington State. April 2001.

46. Saver, Barry G.; Bowman, Robert; Crittenden, Robert A.; Maudlin, Robert K.; Hart, L. Gary. Barriers to Residency Training of Physicians in Rural Areas. April 1998.

47. Larson, Eric H.; Hart, L. Gary; Goodwin, Mary-Katherine; Geller, Jack; Andrilla, Catherine. Dimensions of Retention: A National Study of the Locational Histories of Physician Assistants. April 1998.

48. Baldwin, Laura-Mae; Rosenblatt, Roger A.; Schneeweiss, Ronald; Lishner, Denise M.; Hart, L. Gary. Rural and Urban Physicians: Does the Content of their Practices Differ? May 1998.

49. Geyman, John P.; Hart, L. Gary; Norris, Thomas E.; Coombs, John B.; Lishner, Denise M. Physician Education and Rural Location: A Critical Review. February 1999.

50. Hart, L. Gary; Morrill, Richard; Cromartie, John. A Guide to the Use of Rural and Urban Commuting Areas (RUCAs) in Health Care Analyses. (forthcoming)

51. Hart, L. Gary; Rosenblatt, Roger A.; Lishner, Denise M.; Friedman, Harvey; Baldwin, Laura-Mae. Where Do Elderly Rural Residents Obtain their Physician Care? A Study of Medicare Patients in Washington State. (forthcoming)

52. Ellsbury, Kathleen E.; Doescher, Mark P.; Hart, L. Gary. The Production of Rural Female Generalists by U.S. Medical Schools. January 1999.

53. Lishner, Denise M.; Rosenblatt, Roger A.; Baldwin, Laura-Mae; Hart, L. Gary. Emergency Department Use by the Rural Elderly. November 1998.

54. Baldwin, Laura-Mae; Grossman, David C.; Casey, Susan; Hollow, Walter; Sugarman, Jonathan R.; Freeman, William L.; Hart, L. Gary. Perinatal and Infant Health Among Rural and Urban American Indians/Alaska Natives. June 1999.

55. Larson, Eric H.; Hart, L. Gary; Muus, Kyle; Geller, Jack. Content of Physician Assistant Practice: Results from a National Survey. May 1999.

56. Richardson, Mary; Casey, Susan; Rosenblatt, Roger A. Local Health Districts and the Public Health Workforce: A Case Study of Wyoming and Idaho. November 1999.

57. Larson, Eric H.; Hart, L. Gary; Ballweg, Ruth. National Estimates of Physician Assistant Productivity. January 2000.

58. Hart, L. Gary; Norris, Thomas E.; Lishner, Denise M. Attitudes of Family Physicians in Washington State Toward Physician-Assisted Suicide. February 2002.

59. Rosenblatt, Roger A.; Baldwin, Laura-Mae; Chan, Leighton; Fordyce, Meredith A.; Hirsch, Irl B.; Palmer, Jerry P.; Wright, George E.; Hart, L. Gary. The Quality of Care Received by Diabetic Patients in Washington State: A Rural-Urban Comparison. March 2000.

60. Wright, George E.; Paschane, David M.; Baldwin, Laura-Mae; Domoto, Peter; Cantrell, Diana; Hart, L. Gary. Distribution of the Dental Workforce in Washington State: Patterns and Consequences. March 2001.

61. Rosenblatt, Roger A.; Casey, Susan; Richardson, Mary. Rural-Urban Differences in the Public Health Workforce: Findings from Local Health Departments in Three Rural Western States. January 2001.

62. Ellsbury, Kathleen E.; Baldwin, Laura-Mae; Johnson, Karin; Runyan, Sue; Hart, L. Gary. Gender-Related Factors in the Recruitment of Generalist Physicians to the Rural Northwest. February 2001.

63. Norris, Thomas E.; Hart, L. Gary; Larson, Eric H.; Tarczy-Hornoch, Peter; Masuda, David; Fuller, Sherrilynne; House, Peter J.; Dyck, Sarah M. Low-Bandwidth, Low-Cost Telemedicine Consultations Between Rural Family Physicians and Academic Medical Center Specialists: A Multifaceted Satisfaction Study. February 2001.

64. Larson, Eric H.; Palazzo, Lorella; Berkowitz, Bobbie; Pirani, Michael J.; Hart, L. Gary. The Contribution of Nurse Practitioners and Physician Assistants to Generalist Care in Underserved Areas of Washington State. June 2001.

65. Rosenblatt, Roger A.; Rosenblatt, Fernne Schnitzer. The Role and Function of Small Isolated Public Health Departments: A Case Study in Three Western States. June 2001.

66. Thompson, Matthew J.; Skillman, Susan M.; Johnson, Karin; Schneeweiss, Ronald; Ellsbury, Kathleen; Hart, L. Gary. Assessing Physicians' Continuing Medical Education Needs in the U.S.-Associated Pacific Jurisdictions. September 2001.

67. Hart, L. Gary. The Evaluation Questionnaires of Office for the Advancement of Telehealth Grantees. September 2001.

68. Skillman, Susan M.; Hutson, Troy; Andrilla, C. Holly A.; Berkowitz, Bobbie; Hart, L. Gary. How Are Washington State Hospitals Affected by the Nursing Shortage? Results of a 2001 Survey. May 2002.

69. Rosenblatt, Roger A.; Schneeweiss, Ronald; Hart, L. Gary; Casey, Susan; Andrilla, C. Holly A.; Chen, Frederick M. Family Medicine Residency Training in Rural Areas: How Much Is Taking Place, and Is It Enough to Prepare a Future Generation of Rural Family Physicians? March 2002.

70. Palazzo, Lorella; Hart, L. Gary; Skillman, Susan M. The Impact of the Changing Scope of Practice of Physician Assistants, Nurse Practitioners, and Certified Nurse-Midwives on the Supply of Practitioners and Access to Care: Oregon Case Study. March 2002.

71. House, Peter J. The Direct-Care Paraprofessional Workforce Providing Long-Term Care Services in the United States: Wyoming Case Study. March 2002.

72. Baldwin, Laura-Mae; Beaver, Shelli K.; Hart, L. Gary; MacLehose, Richard F; Every, Nathan; Chan, Leighton. Quality of Care for Acute Myocardial Infarction in Rural and Urban U.S. Hospitals. June 2002.

73. Patterson, Davis G.; Skillman, Susan M. Health Professions Education in Washington State: 1996-2000 Program Completion Statistics. October 2002.

74. Chan, Leighton; Hart, Gary; Ricketts, Thomas C., III; Beaver, Shelli K. An Analysis of Medicare's Incentive Payment Program for Physicians in Health Professional Shortage Areas. August 2003.

75. Women's Reproductive Health Care in Rural Washington: Who Provides Care and What Is their Scope of Practice? October 2001.

76. Johnson, Karin E.; Kaltenbach, Emily; Hoogstra, Kenneth; Thompson, Matthew J.; Hagopian, Amy; Hart, L. Gary. How International Medical Graduates Enter U.S. Graduate Medical Education or Employment. August 2003.

77. Thompson, Matthew J.; Lynge, Dana Christian; Larson, Eric H.; Tachawachira, Pantipa; Hart, L. Gary. Characterizing the General Surgery Workforce in Rural America. May 2004 (forthcoming).

78. Baldwin, Laura-Mae; Hollow, Walter B.; Casey, Susan; Hart, L. Gary; Larson, Eric H.; Moore, Kelly; Lewis, Ervin; Grossman, David C. Access to Specialty Health Care for Rural American Indians in Two States. January 2004. (forthcoming)

79. Skillman, Susan M.; Hutson, Troy; Andrilla, C. Holly A. Washington State Hospitals: Results of 2002 Workforce Survey. August 2003.

80. Baldwin, Laura-Mae; Fay, Miriam M.; Larson, Eric H.; Lishner, Denise M.; Mauksch, Larry B.; Katon, Wayne J.; Walker, Edward; Hart, L. Gary. Modeling the Mental Health Workforce in Washington State: Using State Licensing Data to Examine Provider Supply in Rural and Urban Areas. October 2003.

81. Johnson, Karin E.; Skillman, Susan M.; Ellsbury, Kathleen E.; Thompson, Matthew J.; Hart, L. Gary. Updating Hospital Reference Resources in the US-Associated Pacific Basin: Efforts of the Pacific Islands Continuing Clinical Education Program (PICCEP). September 2003.

82. Benedetti, Thomas J.; Baldwin, Laura-Mae; Andrilla, C. Holly A.; Hart, L. Gary. The Productivity of Washington State's Obstetrician-Gynecologist Workforce: Does Gender Make a Difference? WWAMI Center for Health Workforce Studies, October 2003.