OECD Health Working Papers No. 37

The US Physician Workforce: Where Do We Stand?

Richard Cooper

https://dx.doi.org/10.1787/228550866304

OECD

Unclassified **DELSA/ELSA/WP2/HEA(2008)4**

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development **13-Oct-2008**

English text only

DIRECTORATE FOR EMPLOYMENT, LABOUR AND SOCIAL AFFAIRS
Employment, Labour and Social Affairs Committee
Health Committee

DELSA/ELSA/WP2/HEA(2008)4
Unclassified

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JEL classification: J61, I19

JT03252725

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ACKNOWLEDGEMENTS

Special recognition and thanks are given to John R. Boulet, PhD, Assistant Vice-President for Research and Evaluation, Educational Commission for Foreign Medical Graduates (ECFMG) and John J. Norcini, PhD, President and CEO of the Foundation for Advancement of International Medical Education and Research at the ECFMG, both of whom provided a great deal of statistical information for this report.

This paper is one in a series of case studies undertaken as part of a project on Health Workforce and International Migration. The project was jointly undertaken by the OECD and the World Health Organization, which seconded a WHO official to the OECD to work on the project. We are grateful to the Swiss authorities for the financial support which supported this secondment.

The Health Workforce and International Migration project has received direct financial support from Australia and Canada, and has benefitted from voluntary contributions in support of the Health Systems Performance work programme from other member countries.

The Health Workforce and International Migration project has been co-financed by a grant provided by the Directorate General for Health and Consumer Protection of the European Commission. Nonetheless, the views expressed in this report should not be taken to reflect the official position of the European Union.

SUMMARY

This review surveys trends in physician supply in the United States from 1980 to the present with particular attention to the participation of International Medical Graduates. It discussed the composition of the physician workforce with regards to the number of family practitioners, specialists, women physicians and the aging of the workforce. Changes in the inflows and outflows of the physician workforce are discussed and, in particular, how international migration, retirement, part-time practice and alternative employment have impacted the physician workforce.

The study explores factors that influence the demand for physicians, with an emphasis on economic development, and discusses some of the obstacles that exist in achieving a future supply of physicians that is commensurate with the projected demand. It further explores the relationship between health care spending and GDP in the context of geographic variations and public and private health insurance. The study evaluates past attempts to measure the need for physicians in the United States and it projects the future demand for physicians and the actions to expand the physician workforce. This leads to a review of US policies and regulations regarding medical education licensure, specifically focusing on foreign physicians. Finally, the paper considers implications of physician shortages and the recruitment of physicians from abroad.

RÉSUMÉ

La présente étude consistait à observer l'évolution de l'offre de médecins aux États-Unis de 1980 à nos jours, en accordant une attention particulière aux médecins diplômés étrangers. On y examine la composition du corps médical, dont le nombre de médecins de famille, de spécialistes, de femmes médecins, ainsi que la question de son vieillissement. On y réfléchit sur l'évolution des flux d'entrées et de sorties de médecins en activité et, en particulier, sur la manière dont les migrations internationales, les départs à la retraite, l'exercice à temps partiel et la possibilité d'exercer un autre emploi ont influé sur cette population.

L'étude recense les facteurs influant sur la demande de médecins, en insistant sur le développement économique, et analyse certains des obstacles en place susceptibles d'empêcher que, dans l'avenir, l'offre de médecins soit à la mesure de la demande (calculée par projections). L'étude analyse également la relation entre les dépenses de soins de santé et le PIB en tenant compte des variations selon la situation géographique et selon que les systèmes d'assurance-maladie sont publics ou privés. Par ailleurs, les efforts déployés dans le passé pour mesurer le besoin en médecins des États-Unis sont évalués. L'étude contient aussi des projections de la demande future de médecins et des dispositions à prendre pour étoffer cette population. Ces travaux conduisent à examiner les politiques et réglementations américaines en matière de diplômes conférant le droit d'exercer la médecine, en s'intéressant tout particulièrement aux médecins étrangers. L'ouvrage se termine par une réflexion sur les implications de la pénurie de médecins et le recrutement de médecins de l'étranger.

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I. TRENDS IN PHYSICIAN SUPPLY, 1980-2005

Physician Supply

1. During the period from 1980 through 2005, the total supply of physicians in the US grew by 85%, while the population grew by 25%, resulting in a 48% growth in the number of physicians per capita, from 198 per 100 000 of population in 1980 to 294 per 100 000 of population in 2005 (Table 1) (1). Throughout this period, the per capita number of primary care physicians (family medicine, general internal medicine and general pediatrics) remained relatively constant, fluctuating between 77 and 86 per 100,000 of population, whereas specialist supply almost doubled, from 111 per 100 000 of population in 1980 to 210 per 100 000 of population in 2005. The percent of physicians who are women also increased, as more women sought careers in medicine, and the average age of all physicians increased, as the youthful cohort of the 1970s that resulted from medical school expansion aged (Table 2).

Table 1: Physician Supply 1980-2005

	1980	1985	1990	1995	2000	2005
Total Physicians	198	215	233	249	264	294
Specialists	111	133	156	169	182	210
Primary Care Physicians	86	82	77	80	82	84

Source: AMA Physician Characteristics and Distribution in the US
Chicago, American Medical Association, 1980-2006

Table 2: Active Physicians by Gender and Age, 1985-2004

		<35	35-44	45-54	55-64	65+	Total
1985	Male	107 042	129 604	88 942	69 966	43 058	438 612
	Female	44 827	23 845	9 450	5 452	2 884	86 458
	Total	151 869	153 449	98 392	75 418	45 942	525 070
1995	Male	87 883	153 904	130 238	81 088	54 237	507 350
	Female	45 912	55 400	25 866	8 904	3 178	139 260
	Total	133 795	209 304	156 104	89 992	57 415	646 610
2004	Male	79 985	135 302	158 410	118 800	75 984	568 481
	Female	62 280	74 932	56 700	22 815	8 440	225 167
	Total	142 265	210 234	215 110	141 615	84 424	793 648

Source: AMA Physician Characteristics and Distribution in the US
Chicago, American Medical Association, 1980-2006

Table 3: Active Physicians by Origin and Specialty, 2004

			Patient Care				Other Professional Activity			
					Hospital-Based					
		Total physicians	Total Patient Care	Office Based	Residents/ Fellows	Physician Staff	Administration	Teaching	Research	Other
Total	Total	792 650	700 287	538 538	102 563	59 186	15 150	10 246	14 410	4 050
	GP/FM	91 991	88 704	73 234	9 221	6 249	1 435	1 391	209	252
	Specialty	700 659	611 583	465 304	93 342	52 937	13 715	8 855	14 201	3 798
USMG	Total	611 615	526 660	414 927	71 748	39 985	13 137	8 548	11 596	3 177
	GP/FM	70 951	68 034	58 360	5 139	4 535	1 255	1 287	186	189
	Specialty	540 664	458 626	356 567	66 609	35 450	11 882	7 261	11 410	2 988
IMG	Total	181 035	173 627	123 611	30 815	19 201	2 013	1 698	2 814	873
	GP/FM	21 040	20 670	14 874	4 082	1 714	180	104	23	63
	Specialty	159 995	152 957	108 737	26 733	17 487	1 833	1 594	2 791	810
USMG	% of USMGs		86.1%	67.8%	11.7%	6.5%	2.1%	1.4%	1.9%	0.5%
IMG	% of IMGs		95.9%	68.3%	17%	10.6%	1.1%	0.9%	1.6%	0.5%

Source: AMA Physician Characteristics and Distribution in the US, Chicago, American Medical Association, 2006.

2. Table 3 displays the percent of US medical graduates (USMGs) and International Medical Graduates (IMGs) who were active physicians in the AMA Masterfile in 2004, and additional detail is provided concerning the number who were in General and Family Practice (GP/FP) and those who were specialists. A higher percentage of IMGs than USMGs were involved in patient care, in part because a higher percentage were residents and fellows, but similar percentages of IMGs and USMGs were GP/FPs (11.6%) and specialists (88.4%).

Physician-nurse Ratios

3. Between 1980 and 2000, the total supply of licensed registered nurses (RNs) increased by 31% while the supply of active physicians (those working more than 20 hours per week) increased by 33% (2). However, a greater proportion of the nurses in 2000 than in 1980 were active, thereby increasing the number of nurses who were employed in nursing over these two decades by 42%. Moreover, because more of those who were employed in nursing in 2000 worked full-time, the full time equivalent (FTE) supply of nurses in 2000 had increased even more, by 54%. As a result, while the ratio of total licensed nurses to active physician remained rather constant throughout this period from 1980 to 2000, at approximately 3.65:1.00, the ratio of FTE nurses to active physicians rose from 1.78:1.00 in 1980 to 2.05:1.00 in the 1990s. However, as discussed below, the entire health care labour force, which includes not only nurses but also aids, technicians and other workers, increased even more rapidly. Because the entry of new physicians into the workforce has been fixed since 1997 (see below), while the rate of entry of nurses has begun to increase, it is likely that the nurse-to-physician ratio will increase above the level of the late 1990s.

Nurse Practitioners and Physician Assistants

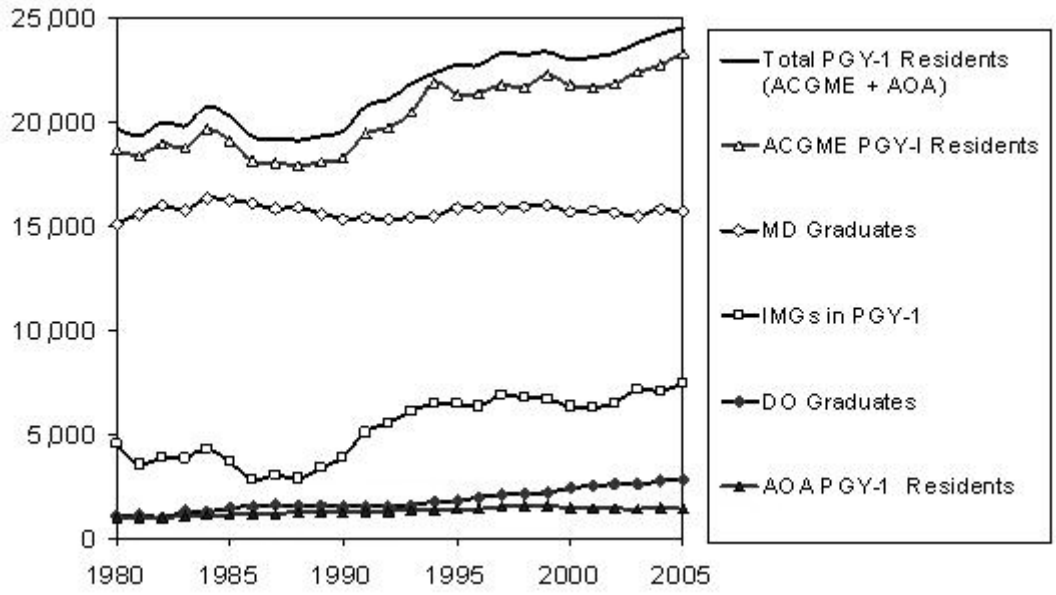
4. In response to a call for more primary care providers in the early 1990s, there was a major emphasis on training more physician assistants (PAs) and level nurse practitioners (NPs) (3, 4). While this continues, there also has been an effort to increase their level of training and clinical qualifications. Within the past several years, many PA programs have lengthened their duration of training, while nursing schools have begun to transition from two-year masters level NP programs to three-year programs that will lead to degrees as doctors of nursing practice (DrNP). The number of NPs trained annually reached approximately 7 500 in the late 1990s and has remained at that level, while the number of PAs trained annually increased to 4 300 in 2005 and continues to increase. Over the period from 1990 to 2005, the total number of NPs in practice more than tripled, from 28 600 to 105 000, although only 60% nurses who functioned as NPs were nationally certified as nurse practitioners or held state recognition as nurse practitioners or advanced practice nurses. Over the same period, the number of practicing PAs tripled, from 19 000 in 1990 to 58 000 in 2005.

II. INFLOWS AND OUTFLOWS

Inflows into the Physician Workforce (5)

5. The number of physicians entering the workforce in the US is almost entirely determined by the number who complete residency training in programs that are approved either by the Accreditation Council on Graduate Medical Education (ACGME), which accredits programs for allopathic (MD) physicians, or the American Osteopathic Association, which accredits programs for osteopathic (DO) physicians. Very few physicians are licensed without undergoing this step, and those few who are so licensed are usually distinguished academics who have been invited to teach in the US. This pattern is unlike that of other developed countries, which license physicians who have received their post-medical school training elsewhere.

Figure 1a: Medical School Graduates and PGY-1 Residents without Prior Residency



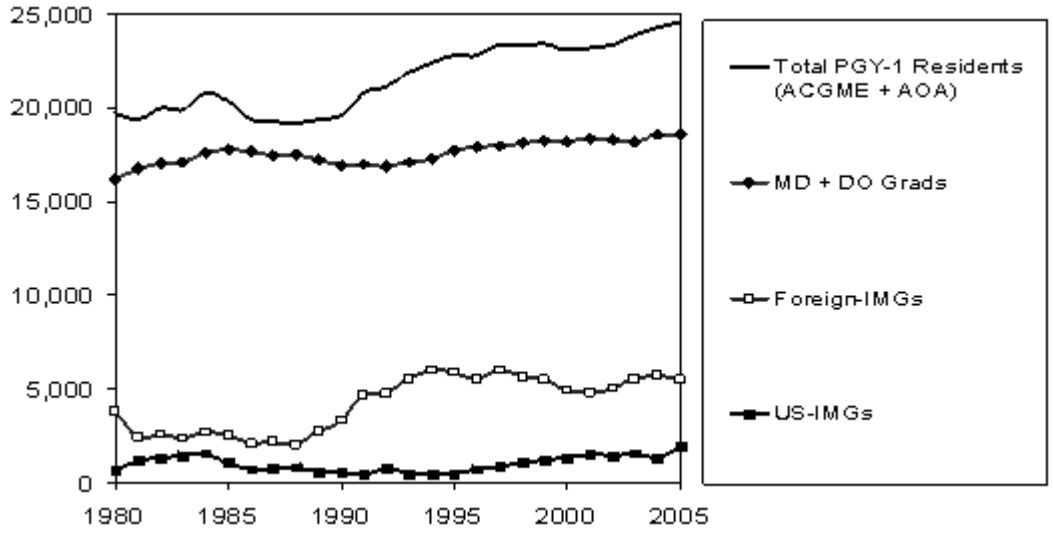
Source: JAMA annual education issue and ECFMG.

US Medical Graduates (USMGs) and International Medical Graduates (IMGs)

6. Figure 1a displays the number of post graduate year-1 (PGY-1) residents sponsored by the ACGME and AOA, the numbers of MDs and DOs graduating from US schools (almost all of whom enter residencies), and the number of IMGs in PGY-1 positions. It should be noted that, because the number of AOA-approved residency positions is not adequate for the increasing number of DO graduates, a growing percentage of DOs receive their residency training in ACGME-approved residency programs or in programs jointly approved by the ACGME and AOA. There is a gap of approximately 25% between the number of MD and DO students who graduate from schools in the US and the total number of residents entering an initial PGY-1 residency positions. These additional positions are filled by international medical

graduates (IMGs), either US citizens (US-IMGs) or foreign nationals (foreign-IMGs). Like US graduates, IMGs must pass the first two steps of the US Medical Licensing Examination (USMLE) prior to entering residency training, and they must pass the remainder of the exam sequence to obtain full licensure, which is granted by the states.

Figure 1b: Medical School Graduates and PGY-1 Residents without Prior Residency



Source: JAMA annual education issue and ECFMG

US-IMGs

7. Figure 1b distinguishes between US and foreign IMGs. For this purpose, the number of US-IMGs was estimated from the number of individuals newly certified by the ECFMG, since virtually all US citizens who achieve certification obtain residencies. Between 1980 and 2000, approximately 1 000 US-IMGs entered residency training annually, a number that has increased in recent years, largely because of the growth of medical schools in the Caribbean (see below). In 2006, approximately 2 750 US citizens who are in enrolled in medical schools outside of the US registered for the first portion of the examination (USMLE-Step 1), which can be taken during or after the second year of medical school (6). This large number of exam-takers indicates that there will be an appreciable increase in the number of US-IMGs entering residency over the coming years. Also in 2006, more than 12 000 foreign-IMGs made initial application for the USMLE-Step 1 exam.

Fifth Pathway

8. In addition to US-IMGs who complete medical school outside of the US, a small number of US citizens begin medical school in another country and complete their education at a US medical school, a process that is known as the "Fifth Pathway" (7). This pathway was begun in 1971, when there was a strong demand for physicians and too little US medical education capacity. At the end of their training, students receive a "certificate of completion," which qualifies them for the USMLE exam and for residency in most states. While there were many programs in the 1970s and 1980, only three remain. Approximately 7 000 physicians obtained their training in this manner, less than 1% of the physician workforce. Currently, approximately 100 students per year go through the Fifth Pathway, almost all from the medical school in Guadalajara, Mexico and almost all through New York Medical College. A small number complete their training at Ponce Medical School in Puerto Rico, and Mount Sinai College of

Medicine in New York has recently re-activated its program. A new program is under consideration at the University of Nevada.

Foreign-IMGs

9. The second group of physicians who fill the gap between available residency positions and US graduates are foreign-IMGs. As shown in Figure 1b, the total number of foreign-IMGs grew appreciably during the early 1990s and plateaued thereafter (5). This plateau phenomenon appeared to be a consequence of a natural limit on the number of residencies that could develop at that time, but it has become policy by means of a Federal law that restricts Medicare reimbursement to hospitals for residents to the number of residency positions that existed in 1996 (8). Despite this restriction, there has been a slight increase in the number of PGY-1 residents over the past several years, in part funded by Medicare through one of several "exceptions" to the 1997 rule (e.g. hospitals that did not have residency programs before 1996 could start new ones under a "cap" to be established three years later) and in part funded by hospitals and thereby not subject to the restrictions of the Medicare funding cap. As a result, the number of PGY-1 foreign-IMGs has held steady at approximately 5 500 annually, despite increases in the numbers of both DO graduates and in US-IMGs, who tend to be preferentially admitted to ACGME residencies because they do not require visas and are fluent in English.

Table 4: MD Physicians Completing USMLE Step 3, 1995-2005

Year	US Graduates	US International Graduates	Foreign International Graduates	Total
1995	14 050	248	2 687	16 985
1996	15 520	432	5 183	21 135
1997	16 140	543	5 317	22 000
1998	16 308	824	5 870	23 002
1999	10 393	563	3 317	14 273
2000	13 624	823	4 211	18 658
2001	13 053	972	4 375	18 400
2002	15 522	1 419	6 003	22 944
2003	16 249	1 690	6 428	24 367
2004	16 475	1 784	6 682	24 941
2005	15 838	1 683	6 511	24 032

Source: Educational Commission on Foreign Medical Graduates (ECFMG), Philadelphia, PA.

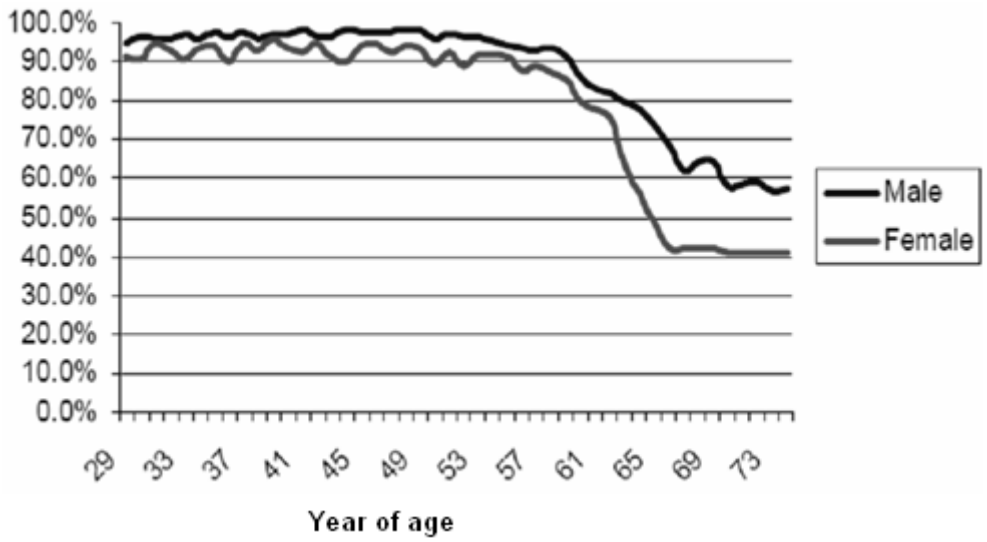
Physicians Entering the Workforce

10. The exact number of physicians who are newly licensed in the US annually is not readily available, but the number who pass USMLE Step 3, the final section of the licensing examination, is known. While a separate examination exists for osteopathic graduates (approximately 1 500 annually), and while some IMGs who pass Step 3 do not remain in the US, the number passing Step 3 is a close approximation of the number of newly-licensed MDs (Table 4) (6). Over the period from 1995 through 2005, the number of US graduates passing USMLE Step 3 has held rather steady at approximately 15 000, while the number of US-IMGs has progressively risen, from approximately 500 annually in the mid-1990s to more than 1,600 over the past few years, and the number of foreign-IMGs rose from approximately 5 000 annually in the mid-1990s to more than 6 500 in the period from 2003-2005.

Immigration and Emigration

11. In contrast to the large number of IMG physicians immigrate to the US, few US physicians emigrate. Mullan has estimated that, of a workforce of more than 800 000 physicians, fewer than 700 emigrate in any given year (9). However, as working conditions improve in developing countries, such as India, there is anecdotal evidence that more physicians return to their home country.

Figure 2: Professional Labour Force Participation Rates



Source: US Census Bureau, Current Population Survey, Year 2000

Retirement

12. There are no formal policies or procedures to retain physicians, and retirement is an informal process. The retirement patterns of physicians in the US have never been well-characterized. However, these patterns are captured in surveys of professionals, since physicians comprise approximately 40% of this sub-group of the labour force. Figure 2 displays the pattern of retirement that was obtained from the Census Bureau's "Current Population Survey" of professionals in 2000 (10). While this category includes professions other than physicians, it is representative of the physician population. These data reveal that the participation of male physicians falls steeply after age 60. Female physicians leave the labour force several years earlier and the decline in their participation is more precipitous. In both cases, persistence in the labour force after age 60 is often on a part-time basis. It is not clear that these participation rates will continue for women physicians. Indeed, there are indications that many more in their 40s and 50s leave the workforce. Projections of the future need for physicians are based on the historical patterns of retirement, and if physicians retire earlier than has been the tradition, the shortages will be worse than currently projected. Part-time employment opportunities exist, including opportunities for older physicians, but the high costs of malpractice insurance, which are not pro-rated for part-time employment, often present a barrier.

Part-time Practice

13. Another factor that is becoming important in the US physician workforce is part-time participation at younger ages, particularly by younger women. This is significant because women now comprise 50% of medical students. For example, among pediatric residents, 60% of women (but only 15%

of men) plan to work part-time. The experience in family practice is similar. Overall, there is approximately a 20% differential in the number of hours worked by men and women physicians during active practice, which is reflected in the approximately 20% differential in earnings of male and female physicians among all specialties. This difference in practice intensity, coupled with time away from practice for child rearing and earlier retirement, creates an overall differential input into clinical practice of as much as 30%. In addition, there are gender-related differences in the content of work. For example, among surgeons, women choose more out-patient surgery and teaching and less on call time, while men choose more inpatient surgery and administrative work and must be more available for night and weekend call. These gender-related differences require attention, as a traditionally a male profession transitions to what will soon become a predominantly female profession.

Alternative Employment

14. While clinical practice remains the predominant career path for physicians, opportunities are growing for careers in medical administration, research, education and business, particularly in pharmaceutical, biotech and medical equipment companies. These opportunities are commonly sought by mid-career physicians, but even new graduates express interest in non-clinical careers. Whereas in 1990 30% of graduating seniors expressed a desire for an academic career (including clinical practice in an academic institution) and 4% sought non-clinical careers, these percentages progressively increased to 35% and 10% among graduates in 2004 (11). Overall, approximately 5% of active physicians are principally engaged in non-clinical activities now, and this can be expected to creep higher. Moreover, few leave the clinical workforce with intent to re-enter at some later date.

Factors affecting the Clinical Participation of Physicians

15. While those undertaking non-clinical roles do not represent a large percentage of physicians, the US physician workforce has traditionally been held to a size that is commensurate with or somewhat below the demand for health care, which leaves little "slack" in the system for physicians to leave clinical practice to serve other roles. The following is a list of trends away from clinical practice, all of which will serve to exacerbate the projected physician shortages over time:

- Non-clinical career changes
- Decreased resident work hours (the 80-hour restriction)
- Part-time employment (particularly among women)
- Temporary exit from the workforce for child-bearing
- Aging of the physician workforce (as the youthful cohort of the 1970s and 1980s ages)
- Added time due to regulatory processes (documentation, authorization, etc.)

16. There are no counterbalancing trends that increase the clinical effort of physicians.

III. ECONOMICS AND INSURANCE

Demand for Health Care

17. Economic expansion, usually expressed as increases in gross domestic produce (GDP) or per capita income, is central to both the demand for health care and the capacity to provide health care service in the US and all other developed nations (12, 13). Changes in GDP and health expenditures in the US over the period from 1980 through 2004 are shown in Tables 5a and 5b (14). Health care spending grew more rapidly than the economy overall, as has also occurred in other OECD countries (15). For example, during the period from 1980 through 2004, while GDP per capita in the US rose by 61% (when expressed as inflation-adjusted 2 000 dollars using the GDP deflator), per capita national health expenditures rose three times as fast (180%) when similarly adjusted and twice as fast (113%) when adjusted for inflation using the implicit price deflator for services (Table 8). The latter represents a ratio of an increase in real health care spending of 1.8% for each 1% increase in real GDP.

Table 5A: United States Health Expenditures, 1980-2004

Year	National health expenditures, $ Billions						National health expenditures, $ Per capita				
	Total	Private	Public	Federal	State and local		Total	Private	Public	Federal	State and local
1980	$255	148	107	72	36		$1,106	641	466	311	155
1981	$295	172	124	83	41		$1,269	737	532	357	175
1982	$332	195	137	92	45		$1,413	830	583	392	191
1983	$367	216	151	103	49		$1,545	909	637	432	205
1984	$404	239	165	113	52		$1,686	998	688	473	215
1985	$442	263	179	123	56		$1,827	1 085	742	509	233
1986	$474	278	196	133	63		$1,941	1 138	802	543	259
1987	$515	301	215	144	71		$2,091	1 219	871	584	287
1988	$577	344	233	155	77		$2,317	1 382	935	624	311
1989	$642	383	259	174	85		$2,554	1 523	1 031	691	340
1990	$717	427	290	194	96		$2,821	1 680	1 140	762	378
1991	$785	456	329	223	106		$3,046	1 770	1 276	867	409
1992	$853	486	367	253	114		$3,263	1 858	1 405	968	437
1993	$917	514	402	278	125		$3,461	1 942	1 520	1 049	471
1994	$966	528	438	303	135		$3,604	1 969	1 636	1 131	505
1995	$1,020	554	467	325	141		$3,762	2 042	1 720	1 199	521
1996	$1,073	580	493	349	144		$3,910	2 113	1 797	1 272	525
1997	$1,130	614	516	365	151		$4,070	2 212	1 857	1 315	542
1998	$1,196	662	533	373	161		$4,257	2 358	1 899	1 327	572
1999	$1,270	710	560	390	170		$4,472	2 500	1 971	1 373	599
2000	$1,359	756	602	418	184		$4,729	2 633	2 096	1 456	640
2001	$1,474	807	667	465	202		$5,079	2 781	2 298	1 602	696
2002	$1,608	881	727	510	217		$5,485	3 007	2 478	1 738	740
2003	$1,741	957	783	554	229		$5,879	3 233	2 646	1 873	774
2004	$1,878	1 030	847	600	247		$6,280	3 446	2 834	2 007	827

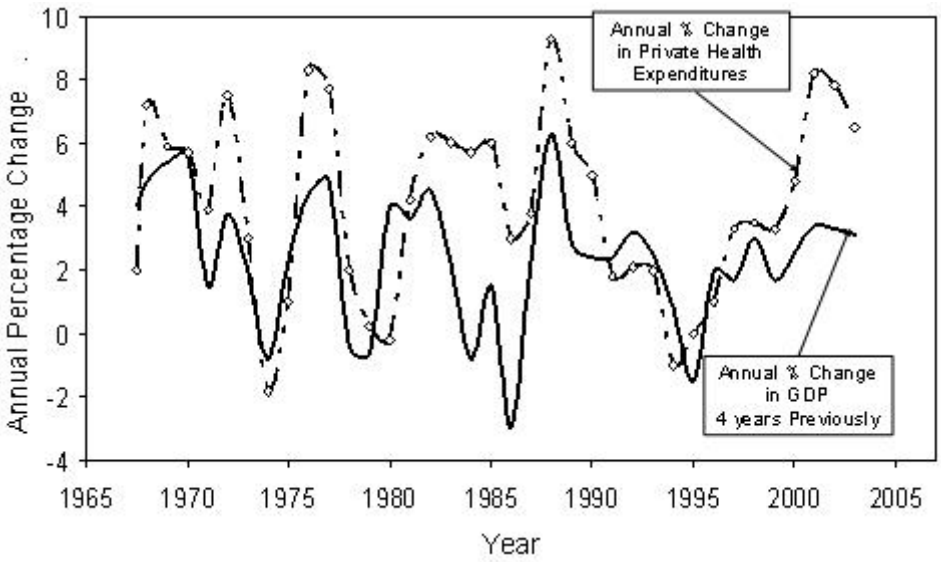
Source: Smith, et al and the National Health Accounts Team. Health Affairs2006; 25(1):186–196.; Bureau of Economic Analysis; Bureau of the Census.

Table 5B: United States Health Expenditures, 1980-2004

Year	U.S. population Millions	GDP $ Billions	National health exp. % of GDP	Annual % change in health expenditures			HExp/ cap	HExp/ cap	GDP/ cap	GDP /cap
				National	Private	Public	Services 2000$	GDP 2000$	current $	2000$
1980	230.4	$2 790	9.1	15.2	14.4	16.3	$2 613	$2 047	$12 249	$22 666
1981	232.8	$3 128	9.4	15.9	16.3	15.3	$2 715	$2 147	$13 601	$23 007
1982	235.1	$3 255	10.2	12.5	13.7	10.7	$2 796	$2 253	$14 017	$22 346
1983	237.4	$3 537	10.4	10.5	10.6	10.3	$2 872	$2 369	$15 092	$23 146
1984	239.6	$3 933	10.3	10.1	10.9	9.1	$2 975	$2 492	$16 638	$24 593
1985	241.9	$4 220	10.5	9.4	9.8	8.8	$3 081	$2 621	$17 695	$25 382
1986	244.2	$4 463	10.6	7.2	5.9	9.2	$3 129	$2 724	$18 542	$26 024
1987	246.5	$4 740	10.9	8.7	8.1	9.6	$3 252	$2 857	$19 517	$26 664
1988	248.9	$5 104	11.3	11.9	14.4	8.3	$3 433	$3 061	$20 827	$27 514
1989	251.4	$5 484	11.7	11.3	11.3	11.4	$3 612	$3 251	$22 169	$28 221
1990	254.3	$5 803	12.4	11.8	11.7	11.9	$3 802	$3 458	$23 195	$28 429
1991	257.7	$5 996	13.1	9.4	6.7	13.4	$3 930	$3 607	$23 650	$28 007
1992	261.3	$6 338	13.5	8.6	6.4	11.6	$4 044	$3 777	$24 668	$28 556
1993	264.8	$6 657	13.8	7.5	5.9	9.6	$4 153	$3 916	$25 578	$28 940
1994	268	$7 072	13.7	5.4	2.6	9	$4 203	$3 993	$26 844	$29 741
1995	271.3	$7 398	13.8	5.6	5	6.4	$4 260	$4 084	$27 749	$30 128
1996	274.3	$7 817	13.7	5.1	4.7	5.7	$4 304	$4 166	$28 982	$30 881
1997	277.6	$8 304	13.6	5.3	5.9	4.6	$4 362	$4 266	$30 424	$31 886
1998	280.8	$8 747	13.7	5.8	7.9	3.4	$4 466	$4 413	$31 674	$32 833
1999	284.1	$9 268	13.7	6.3	7.2	5	$4 592	$4 569	$33 181	$33 904
2000	287.3	$9 817	13.8	6.9	6.5	7.5	$4 729	$4 729	$34 759	$34 759
2001	290.3	$10 128	14.6	8.5	6.7	10.8	$4 919	$4 960	$35 491	$34 659
2002	293.2	$10 470	15.4	9.1	9.2	8.9	$5 174	$5 265	$36 321	$34 861
2003	296.1	$10 971	15.9	8.2	8.6	7.8	$5 375	$5 525	$37 687	$35 452
2004	299	$11 734	16	7.9	7.6	8.2	$5 564	$5 739	$39 922	$36 592
			Ave 1980-2004	**9**	**8.7**	**9.3**	*Adjusted for inflation of services, 2000$*	*Adjusted for inflation of GDP, 2000$*	*Unadjust-ed*	*Adjusted for inflation of GDP 2000$*

Source: Smith, et al and the National Health Accounts Team. Health Affairs2006; 25(1):186–196.; Bureau of Economic Analysis; Bureau of the Census.

Figure 3: Annual Changes in Private Health Expenditures and GDP



Source: Cooper and Getze, Health Affairs 2002; 21:279

Lags

18. To fully understand the relationship between GDP and health care spending in the US, two special characteristics of this relationship must also be understood. First, there is a temporal lag between increases in GDP and subsequent increases in health care spending (16). For private health care expenditures in the US, this lag is approximately four years (Figure 3); i.e. health care spending mirrors the state of the economy three-five years previously (17). Such a lag results from the natural inertia in changing benefits and expanding capacity in the United States in the face of rising economic capacity or in slowing the momentum of growth in the face of declining rates of economic expansion.

19. Increases in spending are reflected principally by growth of the health care labour force. Most of that growth is accounted for by increased numbers of nurses, technicians and other support personnel. Less is reflected in growth of the numbers of physicians. Indeed, throughout the period from 1920 to 2000, physician supply grew more slowly on a per capita basis than did per capita health care expenditures. Moreover, while changes in both health care spending and overall health care employment lag behind changes in the economy by approximately four years, changes in physician supply lag still further, a manifestation of the delays that are inherent in enlarging medical school capacity, expanding residency programs and modifying policies related to the entry of international medical graduates.

Capacity for Health Care Spending

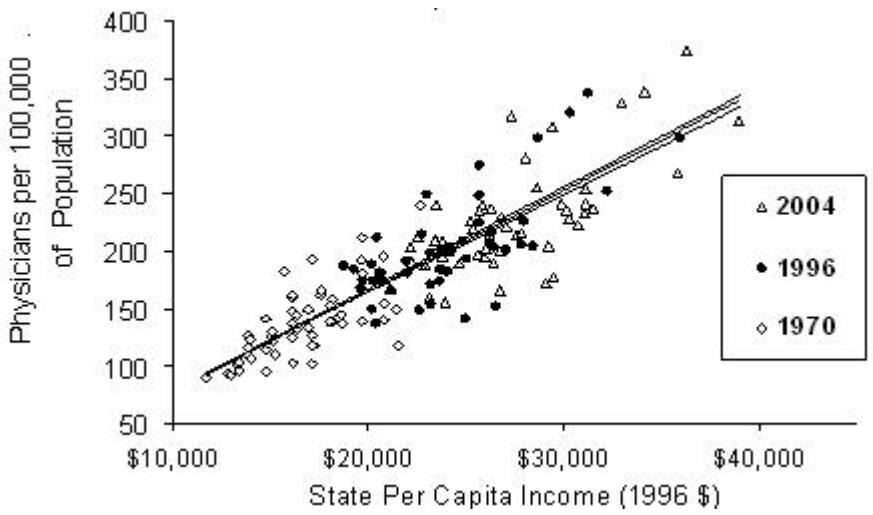
20. Thus, when looked at systematically over long periods of time, economic expansion in the US precedes the growth in health care expenditures, which in turn precedes changes in physician supply (13). As a result, the link between economic growth and health care utilization has sometimes been interpreted as "causal." However, rather than being causal, economic expansion might be thought of as "permissive". A growing economy does not induce health care spending but determines the rate at which health care spending can increase and the ceiling above which expenditures cannot comfortably grow. Health care utilization is pushed to this ceiling by a combination of the unmet desires of patients and the growing range of services that patients could receive but that are not delivered, a quantity that, in some studies, is as large as the volume of services that are delivered. As spending approaches the ceiling, social and political forces

constrain further growth. The resulting dynamic tension between these opposing forces ensures that health care services will rarely decrease below the level that the economy can sustain, nor will they increase above for very long. This phenomenon is so dominant and so durable that, for planning purposes, it can be viewed as the organizing principle around which the demand for physicians evolves.

21. Faced with this reality, the fundamental question becomes, how much additional health care can the economy sustain? In the 1980s, when health care accounted for 10% or less of the GDP, economists postulated that the eventual upper limit might be 15%, a level reached in 2004. But these percentages have meaning only in relation to the magnitude of the economy overall. The portion of the economy that health care can consume depends on how large the total economy is and, therefore, what resources are available for other purposes. Had the economy not grown, it would be crippling to devote 15% of it to health care. However, on an inflation-adjusted basis, GDP grew by one third, which allowed additional resources not only for health care but for other purposes as well. The question is, how long can this upward trend continue?

22. A recent exercise to examine this question concluded that, if over the next 75 years per capita health care spending in the United States grew at a rate that exceeded economic growth by 1% (the differential rate that has existed in the past), spending for non-health purposes could expand sufficiently to sustain education, commerce and the other societal needs (18). This would be true even though health care would account for more than one-third of GDP in 2075. This rate of growth might be expected to slow if the opportunity costs of health care proved to be excessive, but workforce planners must consider the more likely possibility that a continued strong desire for health care, coupled with its real and perceived benefits, will keep demand at the limits that the economy can sustain and that a proportional demand for physicians will exist.

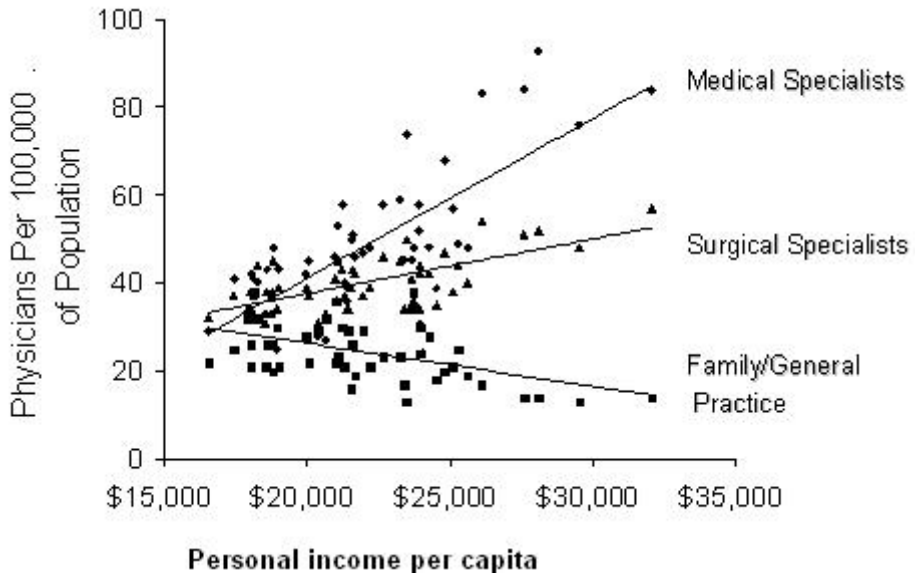
Figure 4: Physician Supply and State per Capita Income: 1970, 1996 and 2004



Note: 1970: R^2 = 0.5129; 1996: R^2 = 0.5273; 2004: R^2 = 0.6011

Source: Cooper, Getzen and Laud, Health Services Research, 2003; 38(2):675-696

Figure 5: Physician Specialties and State per Capita Income



Source: Cooper, Getzen and Laud, Health Services Research, 2003; 38(2):675-696

Geographic Variation

23. Correlations between economic growth, health care utilization and physician supply not only exist longitudinally over time. These same relationships can be observed across large geopolitical units at single points in time. For example, among the 50 states in the US, per capita income correlates with both physician supply and health care spending. In fact, in multiple regression analyses, the state of economic development accounts for more than 80% of the observed differences in physician supply among the states (Figure 4) (12, 13). Similarly, in comparisons among OECD countries, most of the observed differences in health care spending can be explained by differences in per capita GDP. This "variation" (in economic terms) explains much of what, in sociologic terms, is referred to as "maldistribution" of health care services (in population terms). Such variation in relation to the economic level of the community is not unique to health care. It also exists in expenditures for K-12 education, the density of restaurants and even the rate of readership of newspapers. Moreover, the observed differences in physician supply in relation to economic development at the state level are not identical for all specialties of medicine (Figure 5). States with more wealth have a higher demand for non-surgical specialists and a lesser demand for general/family practice physicians. The demand for surgeons and for hospital-based specialties (anesthesiology, radiology and pathology) also increase as wealth increases, but not as steeply as is seen for non-surgical specialists.

The Belief that "More is Less"

24. A large literature has grown around measuring the relationship between variation in expenditures and/or physician supply and outcomes of care (19-21). The fundamental observation is that there are differences in the number and type of physicians in various communities but there are few differences in outcomes or, where there are, the outcomes are poorest where physician density is greatest. This leads some to ask: Wouldn't fewer physicians be needed if the existing differences could be eliminated? One difficulty is in deciding what level of services is ideal, but the major problem is the use of intermediate units of analysis in the conduct of such studies. This is because such units lack either socioeconomic homogeneity or similar degrees of heterogeneity. Indeed, many of the areas with the highest utilization of health resources include admixtures affluent populations, whose economic status determines the quantity

of resources available for health care within the community, and poorer populations, who use health resources inordinately but have poor outcomes, although their outcomes may be better than they would have been in the absence of physician inputs (a factor that is difficult to measure and not included in the relevant analyses).

25. Thus, two fundamental and intersecting sets economic realities underlie the analysis of small-area variation: at the macro-geographic level (states, countries), the level of economic development correlates directly with health care spending (i.e. wealthier countries or states spend more); but at the individual level, the correlation is inverse (i.e. poorer people spend more) (22). These two distinct economic/demographic realities complicate the process of linking the volume of services to outcomes within intermediate geographic units (e.g. counties, hospital referral regions and metropolitan statistical areas) that have been used in studies of geographic variation. Yet it is such studies that form the basis for the conclusion that having more physicians does not add benefit to the health care system, a point of view that has been sufficiently pervasive to have thwarted efforts to energize a national effort to expand physician supply.

26. In summary, the strongest correlate of health care utilization at the macro-geographic level is the level of economic development, a phenomenon that has been chronicled for almost a century in the US and that can be observed throughout the developed world. In planning for the future, therefore, it seems prudent to assume that regional variation in health care (and the demand for physicians) will exist as long as differences in economic status persist and that the demand for physicians will vary accordingly, but at the largest unit of analysis (country), the demand for physician services will to continue to correlate with national economic growth.

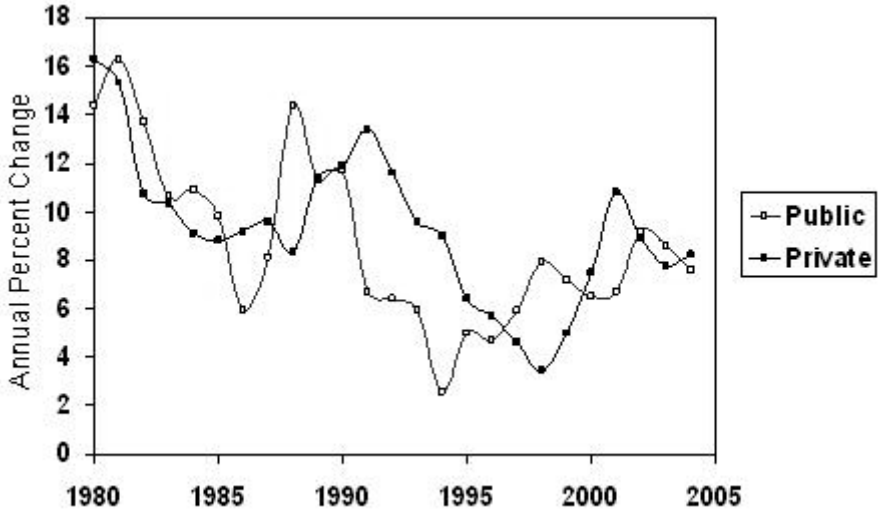
Economic Arguments for Constraint

27. While economic considerations underlie the expansion of physician supply that we have modelled, economic considerations also underlie efforts to constrain physician supply. In his classic 1963 paper, Arrow reasoned that if physician supply were allowed to grow freely, competition among more physicians could lead to lower prices, but, despite this, he favoured restrictions on the number of medical school places as a means of sustaining quality (23). When physician supply subsequently grew and prices did not decline, a popular notion emerged that physicians were taking advantage of information asymmetry to deliver inflated volumes of service through the process of "supplier-induced demand." Although anecdotal experiences seemed to support such a notion, the statistical evidence was weak, and it proved impossible to discern whether the demand for services was being induced by patients or physicians. The pronounced lag that we observed between economic expansion and the growth of physician supply favours patient demand as the major factor.

28. Ultimately, policy experts ignored the distinction, reasoning that, even if physicians don't induce demand, they facilitate utilization, and in a systems such in the US, in which access is largely assured through insurance mechanisms, controlling the number of physicians became a means to limit spending. As a result of this thinking, physician supply has been maintained at the "taut" levels that Eli Ginzberg advocated (24), and managed care has been employed to further limit access. While Arrow justified limiting the number of physicians in terms of quality at the expense of price, current limitations on physician supply are justified in terms of decreasing utilization and, therefore, lowering health care spending. However, as revealed by the "managed care backlash" in the US, such policies ultimately conflict with public expectations. Thus, the driver in this process appears to be economic growth and the cart is the capacity for health care spending. Both physicians and insurers are simply passengers, and the financial leverage that either has with the other is small in proportion to the pace of the ride, making the control of physician supply a poor lever in the quest to constrain health care spending.

29. Other economic grounds for constraining physician supply have also been offered. For example, in the 1950s, supply was constrained as a way of enhancing physicians' incomes. There also is a view that more physicians are simply of diminishing value (see discussion of "Geographic Variation," above), a view that has become more difficult to assess as health care has evolved into an admixture of medical need and consumer good and as value has been given not only to health status but also to matters such as shorter waiting times and more rapid return to work, elements that distinguish health care in the US from that in most other countries. Finally, there is the related concern that health care spending might crowd out other types of spending. Yet it is inevitable that some segments of the economy will grow faster than others. Moreover, there is no consensus that, if there are other needs, health care should yield to them as opposed to other kinds of public or private spending of lesser social value (25). Indeed, some economists see health care spending not only as a means to achieving a social good but also as an economic stimulus. Thus, while there are competing views, and while it is implicit that spending on health care cannot increase disproportionately forever, the trends that link the growth of health care spending to economic expansion and the demand for physicians are likely to exist over the next several decades.

Figure 6: Annual Changes in Public vs. Private Health Expenditures



Source: Smith, et al. Health Affairs, 2006; 25(1): 186-196

Public vs. Private Health Expenditures

30. An important characteristic of health care expenditures in the US is the persistently discordant relationship between private and public expenditures (Figure 6). Approximately half of health care expenditures in the United States are from private sources (employment-sponsored insurance or personal "out-of-pocket" expenditures), and half are from public sources, principally Medicare for the elderly and Medicaid for the poor but also the military and the Veterans Administration (14). Spending in both sectors has grown more rapidly that the economy overall, but their growth is not parallel. Indeed, changes in the rates of spending in these two major sectors are often reciprocal, with rising rates of increase in private expenditures occurring at times of falling rates of increase in public expenditures and vice versa, a phenomenon that is referred to as "cross-subsidization." As a result, an analysis of GDP and health care expenditures in any given year can yield anomalous conclusions. However, over the entire 25 years from 1980 to 2005, both private and public health expenditures rose progressively. Moreover, the average annual change in each was quite similar: on average, private health expenditures grew by 8.7% annually, while public expenditures grew by 9.3%.

Table 6: Trends in Health Insurance Payments (Billions)

	1980	1993	2000	2004
National Health Expenditures	254.9	916.5	1358.5	1877.6
Private funds	147.6	514.2	756.3	1080.3
Out of pocket	68.6	145.3	192.6	236.7
Private health insurance	68.9	297	454.8	658.6
Other sources	20.1	71.9	108.9	136.1
Public funds	107.3	402.3	602.2	847.3
Medicare	37.2	148.4	225.2	309
Medicaid	14.5	76.6	118	173.1
Other federal	19.9	52.5	75.2	118
State and local	35.7	124.7	183.8	247.3
Medicaid	11.5	45.6	83.6	119.6
Other state and local	24.2	79.1	100.2	127.7
Total Medicaid	26	122.4	201.6	292.7
Private, %	57.9%	56.1%	55.7%	57.5%
Medicare, %	14.6%	16.2%	16.6%	16.5%
Medicaid, %	10.2%	13.4%	14.8%	15.6%
Other Federal, state, local, %	17.3%	14.4%	12.9%	13.1%

Source: Smith, et al Health Affairs 2006; 25(1):186-196

Trends in Health Insurance Sources

31. Table 6 displays the growth in public and private health expenditures from various sources over the period from 1980 through 2004 (Table 9). The biggest change was a faster growth in Medicaid, which was not a manifestation of increasing per capita expenditures but of expanding eligibility criteria which included a larger portion of the population, with savings accruing to other local and state sources that fund care for the poor. Thus, while Medicaid's percent of expenditures rose by 5.4%, other governmental sources fell by 4.2%.

Table 7: Trends in Employment-based Insurance

		1994	1998	2002	2004
US Population (millions)	Total	262.1	271.7	285.9	291.2
	Non-elderly	230.8	239.4	250.8	255.9
Employment-based (millions)	Total	159.5	168.2	176.3	174.2
	Non-elderly	148.4	157.1	161	159.5
Employment-based (% of population)	Total	60.9%	61.9%	61.7%	59.8%
	Non-elderly	64.3%	65.6%	64.2%	62.3%
Individually-purchased (millions)	Total	31.3	25.9	26.6	27
	Non-elderly	17.3	16.3	16.8	17.4
Individually-purchased (% of population)	Total	11.9%	9.5%	9.3%	9.3%
	Non-elderly	7.5%	6.8%	6.7%	6.8%

Source: Robinson Health Affairs 2006; 25(6)1475-1486

32. Employment-based insurance is the major source of private insurance for those actively working and, through pension benefits, for many retirees. Among the non-elderly population, more than 60% are covered by employment-based insurance. Including the elderly (retirees), the percentage hovers near 60% (Table 7). Over the decade from 1994 through 2004, there were only slight changes in the percentage of

the population that was covered by employment-based insurance. If there is a trend at all, it is slightly downward, but that down-trend was principally during a period of economic slow-down, and the future direction during the current economic expansion is uncertain. Competition for workers may reverse the trend, or, conversely, a secular movement away from employment-based insurance may continue.

Table 8: Trends in Participation in Managed Care

	1984	1988	1992	1996	2000	2004
Staff	2.1	4.3	2.4	0.8	0.4	0.3
Group	6.6	8	9.7	8.7	7	5
PPO	6.4	19.1	20.1	30.8	40.6	38
Mixed PPO-POS			6.7	23.1	32.1	30

PPO = Preferred provider organization; POS = Point of service

Source: Managed Care Fact Sheets http://www.mcareol.com/factshts/factnati.htm

33. The most dramatic change in health insurance has been in the quantity and type of managed care. During the early 1990s, there was a belief that tightly controlled managed care, as exists in staff and group HMOs, would become a major factor in health care, and policy analysts forecasted a major reduction in the future demand for physician services. The most popular forecast claimed that there would be 165 000 too many physicians in 2000, a 20% surplus. However, as seen in Table 8, such models of insurance were evanescent, as the US population reacted violently against the strictures that they imposed and as the commercial sector saw advantage in offering consumers a form of managed care that was acceptable. As a result, approximately 70% of the population now is insured by health plans that operate through preferred provider networks (PPOs) or mixtures of such networks and the opportunity for patients to seek care out of network (point of service), which is at added cost in the form of co-payments.

IV. PROJECTING THE FUTURE DEMAND FOR PHYSICIANS

34. Beginning during the period of expansion of medical schools in the 1960s and 1970s, the federal government carried out or supported a series of exercises to project the future demand for physicians. There is probably no example of a more poorly-conducted or more deliberately distorted planning activity in the history of the world. It led to the commonly-held view that the US was producing too many physicians and resulted in the curtailment of support of medical education in the US, which underlies the physician shortages that now exist and the deepening shortages that will develop.

Committee on the Costs of Medical Care

35. The first attempts to measure the need for physicians in the US were conducted by the Committee on the Costs of Medical Care (CCMC) published its historic treatise entitled, *The Fundamentals of Good Medical Care* in 1933 (26). The CCMC's assessment was based on quantitating the prevalence of disease, determining the exact number of physician encounters required for each disease and designating the time (in minutes) for each encounter. The CCMC's unique and enduring contribution was to establish two basic tools for workforce analysis: reconstructing the system from its component parts and measuring the parts using the metric of time. Applying these tools, the CCMC concluded that good medical care in 1929 required exactly 283 131 hours of physician time. Assuming that each physician devoted 40 hours per week 50 weeks per year to these tasks, which was "less than the present heroic working schedule," the system would need 140.5 physicians per 100 000 of population, a figure that was 10% greater than the existing supply. Moreover, it concluded that 18% of these physicians should be specialists in one of the 10 specialties then recognized. However, the CCMC warned that if the reader "expects to find here the finality of judgment and precision of detail, he is doomed to disappointment," and further that this methodology should not be used to project future demand, for "it is impossible to determine once and for all time the services which will represent an adequate application of medical knowledge and skills to the needs of the people."

Graduate Medical Education National Advisory Committee

36. Almost half a century later, as the medical school expansion of the 1960s and 1970s was nearing an end, the Graduate Medical Education National Advisory Committee (GMENAC) was created to re-examine the adequacy of physician supply. It adopted the CCMC's core methodology to create its "*adjusted needs model*" (27). Like the CCMC's earlier model, GMENAC's study measured the prevalence of disease and used expert panels to build a consensus regarding the proportion of individuals with each disease who should be treated, the time required for that treatment and the number of physicians necessary to provide that time. However, as was evident in the CCMC's model, its dependence on disaggregating and reconstituting the universe of health care, coupled with its need to assign the *metric of time* to both the elements of care and the effort of physicians in providing them, seriously handicapped its ability to determine what actually was occurring. But GMENAC went one step further. Failing to heed the CCMC's earlier advice, it proceeded to extrapolate its calculations twenty years into the future, predicting that there would be a 30% surplus of physicians in the year 2000, a prediction that has had a pervasive and continuing influence on health policy discussions.

Bureau of Health Professions and Council on Graduate Medical Education

37. During the late 1980s and early 1990s, GMENAC's successor organizations, the Bureau of Health Professions (BHPr) and the Council on Graduate Medical Education (COGME), continued to utilize GEMNAC's demand projections and linked them their own supply projections, a combination that, like GMENAC's original report, projected surpluses of physicians 20 years into the future (28). However, the BHPr's supply projections assumed that the US population would cease to grow, a fact that was wrong when their reports were issued and has continued to be wrong. Indeed, applying the correct population projections, as Cooper first did in 1994, led to the opposite conclusion; i.e. the per capita supply of physicians would be too small to meet the BHPr's projection of future demand (29). In response, the BHPr created its *demand-utilization model* for workforce planning (30). Rather than relying on epidemiologic data, this model assessed the requirements for physicians based on actual measurements of services provided. For this it drew upon the resources of national databases, such as the National Ambulatory Medical Care Survey, the National Hospital Discharge Survey and Medicare claims data, and like its predecessors, the *demand-utilization model* attempted to recreate physicians from their component tasks and to standardize them by applying the *metric of time*. Its greatest success was its replication of GMENAC's flawed conclusions that there would be a 20-30% surplus of physicians, an action that sustained the myth of future physician surpluses and blunted any rational planning for the future needs of the nation.

38. As managed care emerged, COGME gravitated to a new avenue of analysis, the *requirements model*, based on physician utilization in staff/group model HMOs. It was reasoned that these seemingly "closed systems" should be able to account for all of the care provided and all of the time necessary for physicians to provide it. Moreover, by applying the *metric of time*, all of this could be expressed as full time equivalent (FTE) physicians and generalized throughout the physician workforce. However, the HMOs from which this model was built represented a small and shrinking segment of clinical practice, and the assumptions and extrapolations required to describe the entire system from this narrow pedestal are complicated and tenuous. Using this approach in a study that was carried out on behalf of COGME in 1994, Weiner predicted that 65% of all specialists (165 000 physicians) would be in excess supply by the year 2000 (31), a prediction that led to a call for the closure of 20 US medical schools, a sharp decrease in specialty training and the curtailment of funding for international medical graduates (32). However, the failure to properly account for all physician encounters outside and the use of FTE calculations that allow a "real physician" to be more than one "FTE physician" exaggerated the estimate of supply and minimized the estimate of demand that this approach yielded (33). Nonetheless, it was characterized as "the most complete forecast to date" and had a profound impact on policy in the late 1990s, leading ultimately to the "Consensus Statement on the Physician Workforce" in 1997 and to GME provisions in the Balanced Budget Act (BBA) of 1997.

Consensus Statement

39. During the mid-1990s, many groups became interested in formulating recommendations for adjusting GME. In December 1996, six major professional medical organizations (the American Association of Colleges of Osteopathic Medicine, American Medical Association, American Osteopathic Association, Association of Academic Health Centers, Association of American Medical Colleges and National Medical Association) met to find areas of common agreement. Their views were incorporated into a "Consensus Statement," which was to serve as a guide for Congress and the administration regarding physician oversupply (8). This statement proposed aligning the number of GME positions funded by the federal government more closely to the number of USMGs (a 15% reduction), re-establishing the J-1 Exchange Visitor Program as a true exchange program and additional changes that would aid in limiting the number of residents being trained. Many were included in the BBA, the most important being to limit the number of positions that would be funded in each institution to the number that existed as of December

31, 1996, a proposal that I and my colleagues vigorously opposed. Had this not occurred, and had residency positions continued to increase at approximately 350 per year, as had been the case (on average) over the previous four decades, the US would not now be facing the physician shortage that it confronts.

40. Thus, beginning with the CCMC's report in 1933 and continuing through GMENAC's in 1980 to COGME's various reports in the 1990s, physician workforce studies have been dominated by a linear, mathematical mode of thinking based on dissecting and reconstituting the health care system and standardizing its components according to the *metric of time*. The imprecision in this process is legion, and the errors associated with applying it to a multiplicity of diseases, an array of services and a diversity of both patients and physicians are enormous. Using it to project future needs further compounds the error. Moreover, it does so in ways that are not always apparent in the final product. It is unclear why the federal agencies responsible for physician workforce planning adhered so tenaciously to this clearly flawed approach and to the contrived conclusions of physician surplus that they produced (34), nor is it apparent why the professional organizations and foundations that shared the responsibility for assuring an adequate physician supply so uniformly and adamantly professed the belief that surpluses were imminent and worked to curtail the production of physicians, particularly specialists (35).

The Trend Model

41. In 2002, my colleagues and I published a new approach to physician workforce planning, the "Trend Model" (12, 13). Rather than dissecting and reconstituting the current system, as had been done previously, the Trend Model accepts the inherent complexity and diversity of the system and projects future demand by analyzing major trends that affect health care spending. And rather than using the metric of time, it employs a statistical approach, assigning a vector, magnitude and probability to each of the trends considered. The dominant trend is economic development. Even in 1933, the CCMC recognized that "compelling economic forces" influence the distribution of physicians and that "the practice of medicine depends upon the consumers of medical services as much as on the practitioners of medicine." Other important trends are population growth, physician productivity and the growing participation of non-physician clinicians. Combining these trends led to the prediction that there will be approximately 200 000 too few physicians in the period of 2020-2025, a level that is equal to 20% of the physician workforce that is projected for those years (36).

42. Following the publication of this model, COGME sought to test its conclusions. Two years later it issued a report reversing its long-standing view that there would too many physicians and adopted a new position stating that there would be too few (37). Soon thereafter, the American Medical Association, the American Osteopathic Association, the Association of Academic Health Centers, the Association of American Medical Colleges and others reversed their policy positions, adding to a growing consensus among state medical societies and professional organizations that the US would face deepening physician shortages if remedial actions were not taken.

Table 9: Physician's Net Income from Practice

	Average Reported Net Income (Dollars)			Average Net Income, Inflation Adjusted (1995 Dollars)			Percent Change in Inflation-Adjusted Income		
	1995	**1999**	**2003**	**1995**	**1999**	**2003**	**1995-1999**	**1999-2003**	**1995-2003**
All Patient Care Physicians	180 930	186 768	202 982	180 930	170 850	168 122	-5.6*	-1.6	-7.1*
Primary Care Physicians	135 036	138 018	146 405	135 036	126 255	121 262	-6.5*	-4*	-10.2*
Specialists	210 225	218 819	235 820	210 225	200 169	195 320	-4.8*	-2.4	-7.1*
Medical Specialists	178 840	193 161	211 299	178 840	176 698	175 011	-1.2	-1	-2.1
Surgical Specialists	245 162	255 011	271 652	245 162	233 276	224 998	-4.9	-3.6	-8.2*

Source: Center for Health Systems Change, Bulletin #15 June 2006

Table 10: Sources of Payments to Providers

Insurance Source	Physicians	Hospitals	Nursing Homes	Ratio of Physician Reimbursement to Hospital Reimbursement
Private	47%	40%	3%	117.5%
Out of Pocket	18%	3%	43%	600%
Medicare	23%	25%	4%	92%
Medicaid	5%	15%	47%	33.3%
Other Government	7%	16%	3%	43.8%

Source: Smith, et al Health Affairs 2006; 25(1):186-196

Table 11: US Physician Salaries by Specialty

Specialty	Years 1-2	>3	Max
Allergy/ Immunology	$158 000	$221 000	$487 000
Ambulatory	$ 80 000	$112 000	$152 000
Anesthesiology: Pediatrics	$283 000	$311 000	$378 000
Anesthesiology: General	$207 000	$275 000	$448 000
Anesthesiology: Pain	$315 000	$370 000	$651 000
Cardiology: Invasive	$258 000	$395 000	$647 000
Cardiology: Interventional	$290 000	$468 000	$811 000
Cardiology: Non-invasive	$268 000	$403 000	$599 000
Critical Care	$187 000	$215 000	$320 000
Dermatology	$195 000	$308 000	$452 000
Emergency Medicine	$192 000	$216 000	$295 000
Endocrinology	$171 000	$187 000	$260 000
FP (with OB)	$182 000	$204 000	$241 000
FP (w/o OB)	$161 000	$135 000	$239 000
FP - Sports Medicine	$152 000	$208 000	$363 000
Gastroenterology	$265 000	$349 000	$590 000
Hematology/Oncology	$181 348	$245 000	$685 000
Infectious Disease	$154 000	$178 000	$271 000
Internal Medicine	$154 000	$176 000	$238 000
Internal Medicine (Hospitalist)	$161 000	$172 000	$245 000
Medicine/Pediatrics	$139 000	$168 000	$271 000
Medical Oncology	$198 000	$257 000	$455 000
Neonatal Medicine	$286 000	$310 000	$381 000
Nephrology	$191 000	$269 000	$447 000
Neurology	$180 000	$228 000	$345 000
Obstetrics/Gynecology	$211 000	$261 000	$417 000
Gynecology	$159 000	$213 000	$358 000
Maternal/Fetal Medicine	$286 000	$322 000	$610 000
Occupational Medicine	$139 000	$185 000	$290 000
Ophthalmology	$138 000	$314 000	$511 000
Ophthalmology Retina	$280 000	$469 000	$716 000
Orthopedic Surgery	$256 000	$342 000	$670 000
ORS - Hip & Joint Replacement	$330 000	$491 000	$715 000
ORS - Spine Surgery	$398 000	$670 000	$1 352 000
ORS - Sports Medicine	$266 000	$479 000	$762 000
Otorhinolaryngology	$194 000	$311 000	$516 000
Pathology	$169 000	$321 000	$610 000
Pediatrics	$135 000	$175 000	$271 000
Pediatrics - Cardiology	$145 000	$282 000	$607 000
Pediatrics - Critical Care	$196 000	$259 000	$398 000
Peds - Hematology/Oncology	$182 000	$217 000	$251 000
Pediatrics - Neurology	$175 000	$189 000	$362 000
Physiatry	$169 000	$244 000	$313 000

Specialty	Years 1-2	>3	Max
Psychiatry	$149 000	$169 000	$238 000
Psych - Child and Adolescent	$158 000	$189 000	$265 000
Pulmonary + Critical Care	$215 000	$288 000	$417 000
Radiation Oncology	$241 000	$385 000	$787 000
Radiology	$201 000	$354 000	$911 000
Rheumatology	$179 000	$229 000	$378 000
Surgery - General	$226 000	$291 000	$520 000
Surgery - Cardiovascular	$336 000	$515 000	$811 000
Surgery - Neurological	$354 000	$541 000	$936 000
Surgery - Plastic	$237 000	$412 000	$820 000
Surgery - Vascular	$270 000	$329 000	$525 000
Urology	$261 000	$358 000	$619 000

Survey includes base salaries, net income or hospital guarantees minus expenses 2003-2006

Source: Allied Physicians, Inc., Los Angeles Times and Rand McNally

Table 12: Top Fourteen Physician Searches

	2002/03	2003/04	2004/05	2005/06
Internal Medicine	113	124	188	274
Family Practice	122	165	166	257
Radiology	230	202	218	237
Orthopedic Surgery	191	210	210	207
Cardiology	188	181	231	174
General Surgery	84	112	116	165
Hospitalist	55	82	62	112
OB/GYN	110	103	83	111
Gastroenterology	69	105	94	105
Emergency Medicine	40	42	47	91
Urology	56	94	59	75
Anesthesiology	134	98	64	70
Psychiatry	59	54	80	69
Neurology	44	60	56	69
Otolaryngology	42	52	54	57
Total	**1 537**	**1 684**	**1 728**	**2 073**

Source: Merritt Hawkins Associates, 2006

Physician Income and Evidence of Shortages

43. Because the excessive rate of health care spending in the US is principally due to the price of services rather than the volume of services, efforts have been made to decrease unit price, and this is reflected in downward pressure on physicians' fees. As a result, inflation-adjusted physician incomes from practice have fallen over the past decade (Table 9). Physicians have responded in several ways. One has been to derive larger portions of net income from activities outside of the direct care of patients, such as pharmaceutical studies and administrative activities. Another is to shift care away from Medicaid and other governmental sources of reimbursement, which pay physicians poorly although they pay hospitals better, and to provide services that are paid for through private insurance, which is a better payer for physicians

(Table 10). The choice of specialty is also a major determinant of physician income, as seen by the range of incomes displayed in Table 11.

44. Reports from surveys by state medical societies and state agencies that recruit physicians indicate that the current vacancy rates are 7-10%. These shortages are widespread among the states and are most severe in rural areas, although significant shortages are reported in urban centres, as well. The increased demand for physicians is reflected in larger numbers of offers being given to graduating residents and larger salaries and signing bonuses. While this behaviour was restricted to the high-tech specialties only a few years ago, more aggressive recruiting is now occurring among the primary care specialties, such as Family/General Practice and General Internal Medicine. These dynamics are reflected in both the number of searches that recruitment firms are asked to participate in and the distribution of specialties in those searches (Table 12). There is no evidence of physician unemployment anywhere.

V. EXPANDING THE PHYSICIAN WORKFORCE: POLICIES AND ACTIONS

Decisions Regarding Medical Education

45. Unfortunately, planning during the 1980s and 1990s was oblivious to the powerful economic and demographic trends discussed above. Instead (as discussed above), planners forecasted a surplus of physicians. Although these forecasts and the methods they employed have been discredited, they were believed in the 1980s and 1990s and were influential in setting policy in medical education. As a result, the number of places within US allopathic schools was voluntarily frozen at their 1980 levels for more than two decades (Figure 1) (38). In the mid-1990, a few new osteopathic colleges were established, and more were established over the past few years, but only since 2006 has there been any real effort to expand allopathic medical schools. All of these actions have been voluntary – there is no national planning or participation of the federal government in any of these decisions, nor have formal quotas or other restrictions been established within the osteopathic and allopathic professions.

46. The same voluntary moratorium on medical school places in the US was not operative in Mexico, the Caribbean and other off-shore sites, to which many US citizens go for medical school. Coincident with the last expansion of medical education in the US, the number of US-IMGs completing medical school and attaining certification by the ECFMG annually increased from 300-500 in the 1970s to a peak of 1 574 in 1984, but declined thereafter to 500 by 1995, coincident with a decline in applicants to US medical schools and difficulties in several Caribbean schools (6). However, with aggressive growth, particularly in the Caribbean, and with a resurgence of applicants, these numbers have increased progressively since 1995, reaching almost 2 000 in 2005. Moreover, based on the fact that more than 2 500 US citizens who were enrolled in off-shore schools took the early steps of the USMLE exam in 2006, the number of US-IMGs who will be certified by the ECFMG over the next few years is likely to grow still further. Of note, while earlier trends in US-IMGs followed trends in the US applicant pool, the steep rise in US-IMGs since 1995 has occurred in the presence of a relatively small excess of applicants for US medical schools.

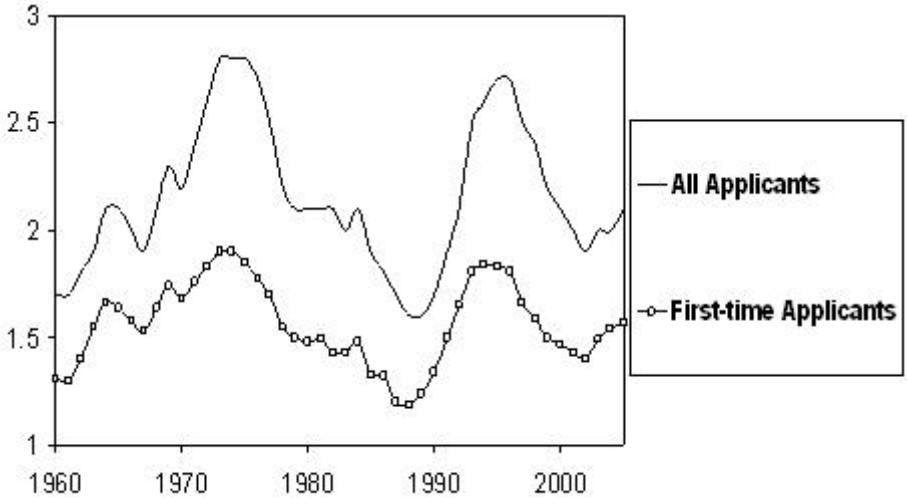
Table 13: Medical School Applicants

	APPLICANTS TO SCHOOLS OF ALLOPATHIC MEDICINE				APPLICANTS TO SCHOOLS OF OSTEOPATHIC MEDICINE			
ACADEMIC YEAR	ALLOPATHIC APPLICANTS	MEN	WOMEN	% WOMEN	OSTEOPATHIC APPLICANTS	MEN	WOMEN	% WOMEN
1980-81	36 100	25 436	10 664	29.5	3, 86	2 982	804	21.2
1981-82	36 727	25 054	11 673	31.8	3, 85	2 984	901	23.2
1982-83	35 730	24 045	11 685	32.7	3 917	2 952	965	24.6
1983-84	35 200	23 239	11 961	34	4 045	2 953	1 092	27
1984-85	35 944	23 468	12 476	34.7	4 126	2 958	1 168	28.3
1985-86	32 893	21 331	11 562	35.2	3 869	2 767	1 102	28.5
1986-87	31 323	20 056	11 267	36	3 515	2 505	1 010	28.7
1987-88	28 123	17 712	10 411	37	3 326	2 324	1 002	30.1
1988-89	26 721	16 457	10 264	38.4	3 030	2 064	966	31.9
1989-90	26 915	16 369	10 546	39.2	3 160	2 092	1 068	33.8

	APPLICANTS TO SCHOOLS OF ALLOPATHIC MEDICINE				APPLICANTS TO SCHOOLS OF OSTEOPATHIC MEDICINE			
ACADEMIC YEAR	ALLOPATHIC APPLICANTS	MEN	WOMEN	% WOMEN	OSTEOPATHIC APPLICANTS	MEN	WOMEN	% WOMEN
1990-91	29 243	17 458	11 785	40.3	3 224	2 142	1 082	33.6
1991-92	33 301	19 601	13 700	41.1	4 163	2 770	1 393	33.5
1992-93	37 402	21 784	15 618	41.8	5 752	3 735	2 017	35.1
1993-94	42 806	24 849	17 957	41.9	7 506	4 753	2 753	36.7
1994-95	45 360	26 393	18 967	41.8	9 336	5 842	3 494	37.4
1995-96	46 586	26 810	19 776	42.5	10 213	6 387	3 826	37.5
1996-97	46 965	26 937	20 028	42.6	10 781	6 553	4 228	39.2
1997-98	43 016	24 745	18 271	42.5	10 764	6 471	4 293	39.9
1998-99	40 996	23 211	17 785	43.4	9 554	5 673	3 881	40.6
1999-2000	38 443	21 048	17 395	45.2	8 396	4 878	3 518	41.9
2000-01	37 089	19 816	17 273	46.6	7 708	4 306	3 402	44.1
2001-02	34 859	18 142	16 717	48	6 898	3 747	3 151	45.7
2002-03	33 625	17 069	16 556	49.2	6 324	3 266	3 058	48.4
2003-04	34 791	17 119	17 672	50.8	6 814	3 466	3 348	49.1
2004-05	35 739	17 721	18 018	50.4	7 240	3 602	3 638	50.2
2005-06	37 364	18 744	18 620	49.8	8 255	4 056	4 199	50.8

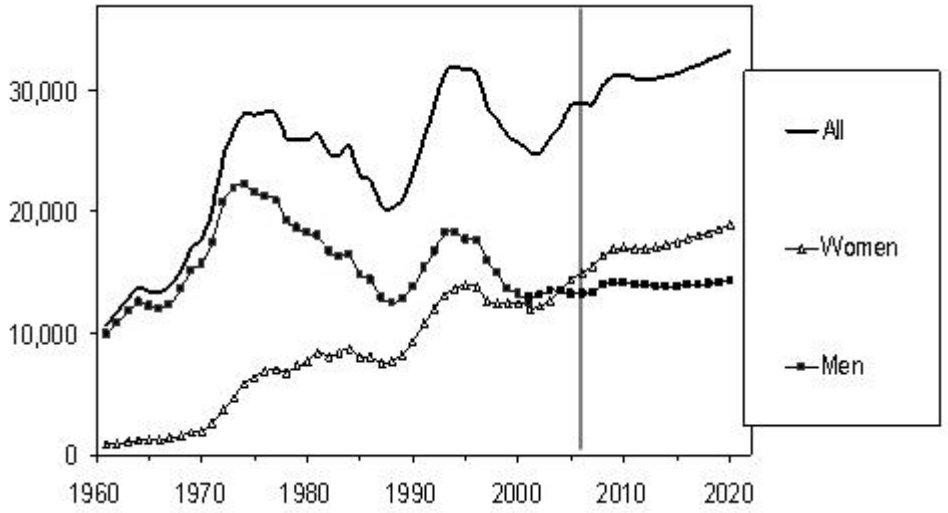
Source: Association of American Medical Colleges and American Association of Colleges of Osteopathic Medicine

Figure 7: Medical School Applicant-to-Acceptance Ratios, 1960-2005



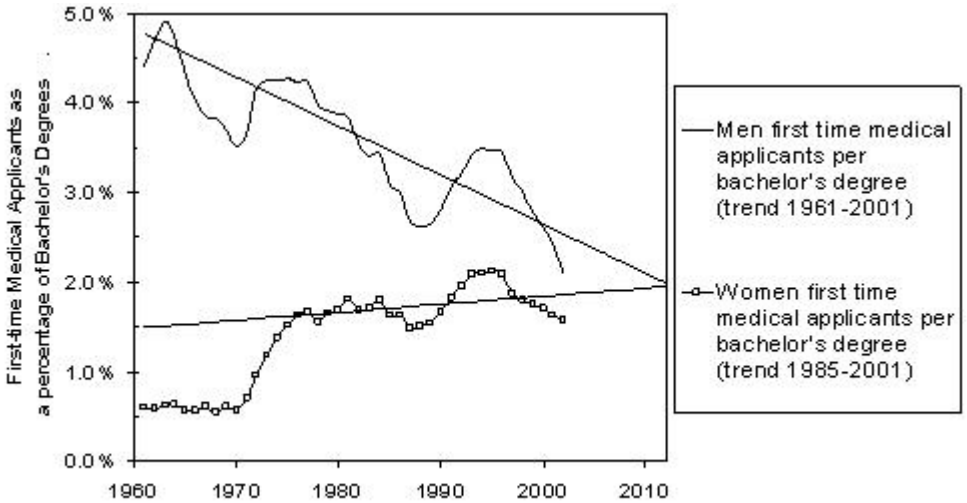
Source: Association of American Medical Journals

Figure 8: First-time MD Applicants, 1961-2006 and extrapolated to 2020



Source: Cooper, Health Affairs, 2003; 22(4): 71-84

Figure 9: First-time MD Applicants as a Percent of Bachelor's Degrees, 1961-2001



Source: Cooper, Health Affairs, 2003; 22(4): 71-84

Medical School Applicants (39, 40)

47. US citizens apply to three groups of medical schools: the 125 established allopathic (MD) medical schools, osteopathic (DO) medical schools (which have increased in number over the past several years by four, to 24) and off-shore medical schools, all of which are allopathic. Table 13 displays the numbers who apply to MD and DO schools. It is generally believed that 85% or more of the approximately 8 000 applicants to DO schools also apply to MD schools. Based on applications to the USMLE exam, approximately 3 000 US citizens were enrolled in off-shore schools in 2004, but it is unknown how many

of them also applied to MD and/or DO schools within the US. The numbers shown in Table 13 include all applicants, both first-time and repeat applicants, and therefore exaggerate the size of the applicant pool. Large fluctuations in numbers of applicants over time are evident.

48. Figure 7 compares the applicant-to-acceptance ratios for first-time and total applicants. Because the accumulated number of repeat applicants increases disproportionately when the number of first-time applicants increases, the amplitude of variation of the total pool exceeds that of the first-time pool. The first-time applicant-to-acceptance ratio fell to its lowest level in the late 1980, when many medical schools failed to fill their classes, the pass rates on the National Board exams fell and attrition prior to graduation increased. This signals that a first-time applicant-to-acceptance ratio of approximately 1.2 is necessary to maintain quality (38). That ratio reached a more recent low of 1.4 in 2002 but has since risen. However, projections of the future applicant pool (Figure 8), based on projections of the numbers of baccalaureates by the National Center for Health Statistics and the propensity of male and female baccalaureates to apply to medical school (see below), indicate that there will be too few qualified applicants for a medical school class size that is more than 20% larger than the current size, a circumstance that has already been set in motion by current expansions of medical school capacity.

49. Figure 8 displays the number of first-time applicants to MD schools by gender. The wide fluctuations referred to above are evident for both genders. Also evident is a general up-trend in the number of women applying to medical school and a down-trend in the number of men. This is due to two separate phenomena. First, the number of women attending universities has trended up since the 1960s and continues to do so, and since the 1960 approximately 2% of women baccalaureates applied to an allopathic medical school (Figure 9). Second, the total number of male baccalaureates annually has undergone little change since the mid-1970s, but the percentage of male baccalaureates who apply to medical school has progressively fallen (Figure 9).

Table 14: First Year Enrolment and Graduates

	ALLOPATHIC MEDICAL SCHOOLS				OSTEOPATHIC MEDICAL SCHOOLS			
	FIRST-YEAR ENROLLMENTS		GRADUATES		FIRST-YEAR ENROLLMENTS		GRADUATES	
ACADEMIC YEAR	TOTAL	% WOMEN	TOTAL	% WOMEN	TOTAL	% WOMEN	TOTAL	% WOMEN
1980-81	17 186	28.9	15 632	24.9	1 496	22	1 151	17.5
1981-82	17 268	30.8	16 012	24.9	1 582	23.9	1 017	18.3
1982-83	17 254	31.7	15 802	26.8	1 682	25.4	1 317	19.8
1983-84	17 150	33	16 343	28.3	1 746	26.3	1 287	20.4
1984-85	16 997	33.6	16 318	30.1	1 750	29.2	1 476	23.2
1985-86	16 963	34.2	16 117	30.8	1 737	28.2	1 560	25.1
1986-87	16 819	35	15 830	32.3	1 724	27.3	1 593	24.8
1987-88	16 713	36.5	15 919	32.8	1 692	29	1 572	27.9
1988-89	16 868	37.1	15 630	33.4	1 780	32.1	1 609	30.5
1989-90	16 756	38.3	15 398	34	1 844	33.4	1 529	28.2
1990-91	16 876	38.8	15 427	36	1 950	34.2	1 534	29.9
1991-92	17 071	39.9	15 356	36.1	1 974	32.7	1 532	32.7
1992-93	17 079	41.9	15 475	38.1	2 035	35.1	1 606	33.2
1993-94	17 121	42.2	15 507	38	2 162	35.7	1 752	34.4
1994-95	17 085	42.2	15 883	39.2	2 217	36.3	1 843	33.4
1995-96	17 058	43.2	15 891	40.9	2 274	37.4	1 932	35.7
1996-97	16 935	42.9	15 894	41.5	2 535	37.8	2 009	35.3

	ALLOPATHIC MEDICAL SCHOOLS				OSTEOPATHIC MEDICAL SCHOOLS			
	FIRST-YEAR ENROLLMENTS		GRADUATES		FIRST-YEAR ENROLLMENTS		GRADUATES	
1997-98	16 867	43.5	15 968	41.7	2 692	39.8	2 096	37
1998-99	16 790	44.4	16 008	42.4	2 745	41.3	2 169	37.7
1999-2000	16 856	45.7	15 712	42.5	2 848	42.2	2 279	37.5
2000-01	16 699	45.9	15 778	43.2	2 927	42.4	2 510	38.8
2001-02	16 875	47.6	15 678	44.2	3 043	46.5	2 536	41.2
2002-03	16 953	49	15 536	45.3	3 079	47.5	2 607	41.5
2003-04	17 035	49.7	15 824	45.9	3 308	50.2	2 713	42.4
2004-05	17 059	49.4	15 736	47.1	3 646	50.1	2 756	46.3
2005-06	17 376	48.4			3 880	49.8		

Source: Association of American Medical Colleges and American Association of Colleges of Osteopathic Medicine

Enrolment and Graduation

50. Table 14 displays the numbers of enrolees in MD and DO schools from 1980 to the present and the number of graduates. As stated above, MD first year enrolment remained essentially unchanged throughout this period at about 17 000, whereas DO enrolment increased from less than 1 800 in the 1980s to more than 3 000 in 2006. Very few foreign nationals are among these enrolees. Except for a few publicly-sponsored DO schools, which were begun in the 1970s and 1980s, all of the DO schools are private, including the four that were established since 2000 and the five that are being planned. In contrast, more than half of the existing MD schools are public, as are nine of the fourteen MD schools that are currently in various stages of planning.

Graduate Medical Education and Medical Licensure

51. While planners and educators froze the expansion of medical schools in 1980, market forces propelled a continued expansion of the Graduate Medical Education programs, a process that started in the 1960s and continued to the mid-1990s at approximately 325 additional PGY-1 positions annually (Figure 1). Many believe that the continued expansion of GME after 1986 was a result of more generous federal (i.e. Medicare) support for GME, which occurred in association with a shift of hospital reimbursement to a system of diagnostic related group (DRG) instead of cost reimbursement. By 1996, the total number of residents and fellows in all years of training had surpassed 100 000, facilitated by in influx of IMGs after 1990. This led policy-makers to endorse a freeze on residency training through a cap on Medicare funding, which was enacted in the BBA of 1997 and applicable to the numbers trained in each hospital in 1996 (discussed above). Only a few GME positions have been added since then, some through various mechanisms that exist within the Medicare stipulations and most through funding by hospitals or physician practice groups.

52. Therefore, the determining factor for the growth of physician supply is not simply the number of medical school places. Because that number (approximately 16 000 MDs plus 2 500 DOs) is only 75% of the 24 500 first-time PGY-1 residency positions, approximately 6 000 IMGs (both US and foreign) now fill the gap. If the cap on Medicare support for GME continues and the number of PGY-1 positions remains at or close to current levels, growth in the numbers of MD and DO graduates from US medical schools will fill many of the PGY-1 positions now filled by IMGs. Moreover, because US-IMGs tend to be chosen for residencies preferentially over foreign-IMGs, due to language and visa considerations, the increasing numbers of US-IMGs that are projected will displace foreign-IMGs. Not until the caps are lifted will the supply of physicians in the US increase over current levels, and, therefore, it seems inevitable that the caps

will be lifted. However, if they are lifted in ways that permit the number of residency positions to increase more rapidly than the number of USMGs, there will be a further draw on the pool of IMGs.

IMGs in Graduate Medical Education

53. Unlike Canada and the UK, the US requires IMG physicians to complete a residency in the US in order to qualify for licensure, except in rare exceptions for physicians of great distinction. Thirty-nine states will also endorse for licensure the Licentiate of the Medical Council of Canada (LMCC) when held by an IMG, but there are no such exceptions for graduates of schools in the UK, Australia, New Zealand or other OECD countries, nor for other participants in NAFTA. Whereas separate paths to licensure previously existed for USMGs and IMGs, the process is now identical for both. Sixteen state boards allow IMGs to take USMLE Step 3 before they have had GME in a US or Canadian hospital. All states, however, require at least 1 year of GME for licensure, and 29 states require 3 years. IMG candidates are not awarded a license until they undertake the required GME in the US and meet other board requirements.

54. The USMLE is given in the following steps:

- Step 1: (usually after the second year of medical school) assesses whether medical school students or graduates understand and can apply important concepts of the sciences basic to the practice of medicine.

- Step 2 CK: Clinical Knowledge assesses whether medical students or graduates can apply medical knowledge for provision of patient care under supervision.

- Step 2 CS: Clinical Skills uses standardized patients to assess whether medical students or graduates have the requisite understanding of clinical science for provision of patient care under supervision.

- Step 3: (during or after residency) assesses whether medical school graduates can apply medical knowledge and understanding of biomedical and clinical science essential for the unsupervised practice of medicine.

55. Although there is a national licensure examination, states vary in other requirements, particularly how many years of residency are required. However, none require service in underserved areas as a condition of licensure for IMGs.

Sites of Training for IMG Residents

56. IMG residents often serve at public hospitals and other hospitals that serve a disproportionate of poor patients. When analyzed in 1995, 106 of the 688 hospitals with residency programs in the core specialties (medicine, surgery, etc) were IMG-dependent (i.e. they had more than 50% IMGs), and 75% of these "IMG-dependent" hospitals provided a disproportionate amount of care for poor patients (41). However, they housed only 60% of the residency programs, and 40% of IMG-dependent residency programs were in hospitals that did not serve unusual numbers of poor patients.

Educational Commission on Foreign Medical Graduates (ECFMG)

57. To participate in residency programs in the US, graduates of medical schools outside of the US (both US citizens and foreign nationals) must be certified by the Educational Commission on Foreign Medical Graduates (ECFMG). Certification requires passage of Steps 1 and 2, together with evidence that the candidate attended at least four years and graduated from a medical school that is listed in the

International Medical Education Directory (IMED). Step 1 and Step 2 (CK) are administered at test centres throughout the world. Step 2 (CS) is administered in the US at test centres in Atlanta, Chicago, Houston, Los Angeles, and Philadelphia. Physicians holding ECFMG certificates may apply for a residency program that is certified by the Accreditation Council on Graduate Medical Education (ACGME) (for MD programs) or the American Osteopathic Association (AOA) (for DO programs). Once accepted into a US residency program, IMG residents are free to select career paths in ways that are identical to USMGs, insofar as their visa status permits.

58. ECFMG Certificate holders may apply for residencies and enter the "match," which is conducted annually by the National Residency Matching Program, or they may obtain unfilled residency positions outside of the match. Those who are accepted into programs must be US citizens or hold valid visas in order to commence training. The most common visa categories include H1B (temporary employment) visas, which many hospitals facilitate; J-1 (exchange visitor) visas, which are administered through ECFMG; or a "Green Card" (permanent residence status) that is granted to family members and to workers in special skilled categories. There is no special provision in NAFTA that permits the entry of physicians. Other than visas and evidence of employment, there are no work permits for physicians. Those with H1B (employment) visas, green cards or other full immigration status have no restrictions. Those on J-1 (exchange) visas are obliged to return to their home country for two years after training unless they agree to practice in an underserved area for three years under the J-1 Visa Waiver program (see below).

Table 15: Applicants Who Achieved ECFMG Certification

Country	Total Applicants	Number Not Certified By ECFMG	Number (%) Certified By ECFMG
US-IMGs	35 381	10 261	25 120 (71%)
China	6 778	2 147	4 631 (68%)
Columbia	3 344	1 705	1 639 (49%)
Egypt	8 561	4 865	3 696 (43%)
Germany	12 709	8 250	4 459 (35%)
India	40 989	12 641	28 348 (69%)
Italy	3 777	2 474	1 303 (34%)
Japan	6 536	5 474	1 062 (16%)
Korea	8 282	7 141	1 141 (14%)
Lebanon	3 625	1 389	2 236 (62%)
Mexico	4 983	3 638	1 345 (27%)
Nigeria	5 224	2 313	2 911 (56%)
Pakistan	18 457	9 322	9 135 (49%)
Philippines	16 948	9 447	7 501 (44%)
Romania	3 164	1 088	2 076 (66%)
Syria	4 443	1 560	2 883 (65%)
Taiwan	4 317	3 088	1 229 (28%)
Turkey	3 185	1 770	1 415 (44%)
UK	5 873	2 694	3 179 (54%)
Former USSR	7 372	2 417	4 955 (67%)
Other	88 633	45 759	42 874 (48%)
Total Foreign IMGs	257 200	129 182	128,018 (50%)

Source: Norcini, Boulet, McKinley and Cooper, 2006

Table 16: ECFMG Certificates and 1st-Time Residents, 1982-2005

	ECFMG Certificates	1st time PGY1 IMGs	Excess Certificate Holders	% Excess
1982	6 952	2 503	4 449	64%
1983	7 362	1 991	5 371	73%
1984	7 811	2 121	5 690	72.8%
1985	4 741	2 495	2 246	47.4%
1986	3 885	1 775	2 110	54.3%
1987	3 937	1 546	2 391	60.7%
1988	4 198	1 658	2 540	60.5%
1989	4 337	2 025	2 312	53.3%
1990	4 982	2 191	2 791	56%
1991	4 946	3 427	1 519	30.7%
1992	12 246	3 576	8 670	70.8%
1993	10 857	5 264	5 593	51.5%
1994	8 708	4 607	4 101	47.1%
1995	9 525	4 523	5 002	52.5%
1996	12 128	4 432	7 696	63.5%
1997	10 297	4 824	5 473	53.2%
1998	11 815	4 606	7 209	61%
1999	5 653	5 569	84	1.5%
2000	5 133	5 423	-290	-5.6%
2001	5 934	4 368	1 566	26.4%
2002	5 429	5 623	-194	-3.6%
2003	9 164	5 600	3 564	38.9%
2004	6 004	5 600	404	6.7%
2005	11 535	5 600	5 935	51.5%
Total	**177 579**	**91 347**	**86,232**	**48.6%**

Source: ECFMG and JAMA annual Medical Education issue

Table 17: ECFMG Certificates 1994-2001 and 1st-Time IMG Residents 1995-2002 by region (yearly average)

	Total Certificates 1994-2001	Residents 1995-2002	Excess Certificates 1994-2001	% Excess
United States-IMGs	977	968	9	0.9%
Foreign-IMGs:	7 670	4 765	2 905	37.9%
South Asia	1 972	1 485	487	24.7%
East Asia	1 726	656	1 070	62%
MidEast/NAfrica	1 055	716	339	32.1%
Latin America	660	497	163	24.7%
FSU/Baltic	854	650	204	23.9%
Sub-Saharan Africa	412	275	137	33.2%
Australia, New Zealand, Canada, Western Europe, Israel	992	487	505	50.9%

Source: ECFMG and JAMA annual Medical Education issue

ECFME Certifications

59. During the period from 1980 through 2000, approximately 35 000 US citizens and 260 000 foreign nationals who attended medical schools outside of the US applied to take the ECFMG exam (6). Of these, 25 000 US citizens (71% of exam takers) and 128 000 foreign nationals (50%) passed all parts of the exam and were certified by the ECFMG (Table 15). The largest number of foreign-IMGs was from India (16% of applicants and 22% of certificates).

60. Table 16 lists both the number of certificates granted each year from 1982 through 2005 and the number of certificate holders who obtained a residency in the US. It includes both US and foreign-IMGs. The number of IMGs who seek ECFMG certification varies markedly each year, related to their perceptions of the likelihood of successfully entering US residency programs. Factors that may influence these perceptions include changes in immigration policy (e.g. availability of H1B visas or concerns about visas after September 11th), changes in test procedures (e.g. addition of the USMLE Step 2(CS) exam that is given only in the US) and changes in the number of residencies available (a number that was frozen in 1996). The number holding ECFMG certificates exceeds the number that obtains residencies. Overall, approximately half of the certificate holders entered a US residency. Table 17 shows detail by region for residency years 1995 through 2002. On average, approximately 5 800 certificate holders (almost all of the US-IMGs and more than 60% of foreign-IMGs) obtained a residency positions annually, but an additional 2 900 (almost 40%) did not. It is not clear what happens to the certificate holders who do not obtain residencies. Some may pursue medicine in other countries. Some may never have intended to receive residency training in the US. Still others may remain in the US, representing a pool of potential physicians, but how many do this is unknown.

Table 18: Country of Medical School for US Citizens Applicants for the USMLE Exam

1991	#	%	1996	#	%	2001	#	%	2006	#	%
Mexico	102	13.75	Grenada	333	19.43	Dominica	333	16.42	Grenada	465	18.16
Dominican Republic	101	13.61	Dominica	318	18.55	Grenada	333	16.42	Dominica	450	17.57
Grenada	78	10.51	Netherlands Antilles	239	13.94	Mexico	234	11.54	Netherlands Antilles	342	13.35
Philippines	58	7.82	Mexico	173	10.09	Netherlands Antilles	223	11	Cayman Islands	236	9.22
Dominica	52	7.01	Dominican Republic	100	5.83	Israel	121	5.97	Mexico	146	5.70
Netherlands Antilles	48	6.47	Philippines	95	5.54	Dominican Republic	107	5.28	Antigua and Barbuda	113	4.41
Israel	47	6.33	Israel	88	5.13	Philippines	82	4.04	Dominican Republic	96	3.75
India	21	2.83	Saint Lucia	57	3.33	India	79	3.90	Saint Kitts and Nevis	86	3.36
Italy	19	2.56	India	46	2.68	Cayman Islands	69	3.40	Poland	81	3.16
Argentina	17	2.29	Pakistan	19	1.11	Ireland	49	2.42	Israel	74	2.89
Germany	15	2.02	Germany	15	0.88	Poland	43	2.12	India	57	2.23
Saint Lucia	15	2.02	Poland	14	0.82	Belize	37	1.82	Philippines	46	1.80
Korea, South	11	1.48	Saint Kitts and Nevis	13	0.76	Hungary	30	1.48	Pakistan	41	1.60
Egypt	9	1.21	Colombia	11	0.64	Saint Lucia	30	1.48	Senegal	29	1.13
Greece	9	1.21	Hungary	10	0.58	Pakistan	25	1.23	Belize	24	0.94
Hungary	9	1.21	Italy	10	0.58	Uganda	21	1.04	Ireland	22	0.86
Pakistan	9	1.21	Romania	10	0.58	Antigua and Barbuda	18	0.89	Saint Lucia	21	0.82
Colombia	8	1.08	Ireland	9	0.53	Australia	18	0.89	Hungary	19	0.74
France	8	1.08	Spain	9	0.53	Saint Kitts and Nevis	14	0.69	Australia	13	0.51
Spain	8	1.08	Costa Rica	8	0.47	Colombia	11	0.54	Egypt	13	0.51
United Kingdom	8	1.08	Egypt	8	0.47	Costa Rica	11	0.54	Costa Rica	12	0.47
Ireland	7	0.94	Venezuela	8	0.47	Trinidad And Tobago	11	0.54	Aruba	10	0.39
Nigeria	7	0.94	Argentina	7	0.41	Cook Islands	10	0.49	Colombia	10	0.39
Costa Rica	6	0.81	Nigeria	7	0.41	Germany	10	0.49	Iran	8	0.31
Switzerland	6	0.81	Russia	7	0.41	Nepal	7	0.35	United Kingdom	8	0.31
Thailand	5	0.67	Belize	6	0.35	Nigeria	7	0.35	Lebanon	7	0.27
Other Countries (36)	59	7.95	United Kingdom	6	0.35	Argentina	6	0.30	Saudi Arabia	7	0.27
			China	5	0.29	Jordan	6	0.30	Czech Republic	6	0.23
			Korea, South	5	0.29	Bangladesh	5	0.25	Germany	6	0.23
			Other Countries (40)	78	4.55	Korea, South	5	0.25	Nigeria	6	0.23
						Other Countries (37)	73	3.60	Cuba	5	0.20
									Jordan	5	0.20
									Korea, South	5	0.20
									Trinidad and Tobago	5	0.20
									Other Countries (43)	87	3.40
Total	**742**	**100.00**	**Total**	**1714**	**100.00**	**Total**	**2028**	**100.00**	**Total**	**2561**	**100.00**

Source: Educational Commission on Foreign Medical Graduates, Philadelphia, PA.

Country of Medical School for US-IMGs

61. Table 18 displays the country of medical school for US citizens who attended medical school outside of the US in 1991, 1996, 2001 and 2006, as determined by the number who applied to take any portion of the USMLE. There are several striking observations. First, the total numbers progressively rose from 742 in 1991 to 2 561 in 2006. Second, the major reason for this increase was growth in the number of students attending medical schools in Mexico and the Caribbean, which accounted for approximately 75% of students in 2006. Three islands alone (Grenada, Dominica and the Netherlands Antilles) accounted for approximately half.

Table 19: PGY-1 IMG Residents by Citizenship at Medical School, 1995-2002

Region	1995	1996	1997	1998	1999	2000	2001	2002
Latin America/ Caribbean	549	563	546	507	528	461	434	492
CEE/FSU/ Baltic States	700	803	741	694	754	578	512	524
Middle East	500	569	528	526	568	619	592	564
North Africa	178	171	176	170	201	186	181	144
Sub-Saharan Africa	295	290	263	289	299	279	277	266
South Asia	1 760	1 655	1 565	1 401	1 416	1 410	1 507	1 474
East Asia-Pacific	675	550	564	479	486	471	466	550
Australia/ New Zealand	43	50	53	63	44	52	30	14
Western Europe	419	419	373	360	399	328	290	247
Canada	35	43	37	35	53	80	88	95
China	275	453	551	501	412	270	201	220
Israel	40	42	40	55	43	42	35	33
Japan	23	32	31	33	33	42	38	34
Philippines	497	362	250	171	154	147	160	209
USA	467	588	752	995	1 089	1 400	1 370	1 430
Unknown	1	-	-	-	1	2	6	13
Total	**6 457**	**6 590**	**6 470**	**6 279**	**6 480**	**6 367**	**6 187**	**6 309**

Source: ECFMG

Table 20a: IMG Residents 2004-2005 by Citizenship at Medical School, All Years

Citizenship at Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
India	6 060	23.56	6 060	23.56
United States Of America	5 685	22.1	11 745	45.66
Pakistan	1 790	6.96	13 535	52.62
China	810	3.15	14 345	55.77
Philippines	783	3.04	15 128	58.81
Iran	573	2.23	15 701	61.04
Nigeria	570	2.22	16 271	63.25
Syria	530	2.06	16 801	65.32
Canada	447	1.74	17 248	67.05
Colombia	446	1.73	17 694	68.79
Lebanon	435	1.69	18 129	70.48
Romania	427	1.66	18 556	72.14
Egypt	417	1.62	18 973	73.76
Germany	298	1.16	19 271	74.92
Russia	297	1.15	19 568	76.07

Citizenship at Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
United Kingdom	264	1.03	19 832	77.1
Jordan	251	0.98	20 083	78.07
Ussr	246	0.96	20 329	79.03
Bangladesh	212	0.82	20 541	79.85
Argentina	211	0.82	20 752	80.67
Cuba	195	0.76	20 947	81.43
Mexico	184	0.72	21 131	82.15
Peru	176	0.68	21 307	82.83
Venezuela	176	0.68	21 483	83.52
Brazil	170	0.66	21 653	84.18
Poland	170	0.66	21 823	84.84
Korea	157	0.61	21 980	85.45
Ukraine	139	0.54	22 119	85.99
Japan	130	0.51	22 249	86.49
Turkey	130	0.51	22 379	87
Myanmar (Burma)	124	0.48	22 503	87.48
Ghana	118	0.46	22 621	87.94
Dominican Republic	116	0.45	22 737	88.39
Ethiopia	108	0.42	22 845	88.81
Greece	103	0.4	22 948	89.21
Bulgaria	102	0.4	23 050	89.61
Iraq	100	0.39	23 150	90
Israel	99	0.38	23 249	90.38
Yugoslavia	98	0.38	23 347	90.76
Thailand	87	0.34	23 434	91.1
Sudan	86	0.33	23 520	91.44
Sri Lanka	85	0.33	23 605	91.77
Nepal	84	0.33	23 689	92.09
Jamaica	67	0.26	23 756	92.35
South Africa	67	0.26	23 823	92.61
Italy	66	0.26	23 889	92.87
Ecuador	63	0.24	23 952	93.12
Haiti	53	0.21	24 005	93.32
Kenya	52	0.2	24 057	93.52
Hungary	51	0.2	24 108	93.72
Trinidad And Tobago	51	0.2	24 159	93.92
Ireland	49	0.19	24 208	94.11
Cameroon	47	0.18	24 255	94.29
Vietnam	44	0.17	24 299	94.46
Belarus	41	0.16	24 340	94.62
Morocco	41	0.16	24 381	94.78
Costa Rica	40	0.16	24 421	94.94
Spain	40	0.16	24 461	95.09
Albania	38	0.15	24 499	95.24
Armenia	37	0.14	24 536	95.39
Lithuania	35	0.14	24 571	95.52

Citizenship at Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
Panama	33	0.13	24 604	95.65
Malaysia	32	0.12	24 636	95.77
Occupied Palestinian Territory	32	0.12	24 668	95.9
Slovakia	32	0.12	24 700	96.02
Australia	31	0.12	24 731	96.14
Georgia	31	0.12	24 762	96.26
Taiwan	31	0.12	24 793	96.38
El Salvador	28	0.11	24 821	96.49
Austria	27	0.1	24 848	96.6
Uzbekistan	27	0.1	24 875	96.7
Czechoslovakia	26	0.1	24 901	96.8
Guatemala	26	0.1	24 927	96.91
Algeria	25	0.1	24 952	97
Afghanistan	24	0.09	24 976	97.1
Croatia	24	0.09	25 000	97.19
Nicaragua	24	0.09	25 024	97.28
France	23	0.09	25 047	97.37
Indonesia	23	0.09	25 070	97.46
Bosnia And Herzegovina	22	0.09	25 092	97.55
Iceland	22	0.09	25 114	97.63
Libya	22	0.09	25 136	97.72
Switzerland	22	0.09	25 158	97.8
Bolivia	21	0.08	25 179	97.89
Moldova	21	0.08	25 200	97.97
Chile	20	0.08	25 220	98.04
Sweden	20	0.08	25 240	98.12
Netherlands	19	0.07	25 259	98.2
Zimbabwe	19	0.07	25 278	98.27
Guyana	17	0.07	25 295	98.34
Saint Vincent And The Grenadines	17	0.07	25 312	98.4
Singapore	17	0.07	25 329	98.47
Honduras	16	0.06	25 345	98.53
Czech Republic	15	0.06	25 360	98.59
Norway	14	0.05	25 374	98.64
Saudi Arabia	14	0.05	25 388	98.7
Uganda	14	0.05	25 402	98.75
Grenada	13	0.05	25 415	98.8
Zambia	13	0.05	25 428	98.85
Denmark	12	0.05	25 440	98.9
Paraguay	12	0.05	25 452	98.95
Belize	11	0.04	25 463	98.99
Kazakhstan	11	0.04	25 474	99.03
Macedonia	11	0.04	25 485	99.07
Sierra Leone	11	0.04	25 496	99.12
Somalia	11	0.04	25 507	99.16

Citizenship at Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
Bahamas	10	0.04	25 517	99.2
Cyprus	10	0.04	25 527	99.24
Uruguay	10	0.04	25 537	99.28
Azerbaijan	9	0.03	25 546	99.31
Barbados	9	0.03	25 555	99.35
Belgium	9	0.03	25 564	99.38
Liberia	9	0.03	25 573	99.42
Bahrain	8	0.03	25 581	99.45
Dominica	8	0.03	25 589	99.48
New Zealand	8	0.03	25 597	99.51
Tanzania	8	0.03	25 605	99.54
Kyrgyzstan	7	0.03	25 612	99.57
Tajikistan	7	0.03	25 619	99.6
Botswana	6	0.02	25 625	99.62
Kuwait	6	0.02	25 631	99.64
Portugal	6	0.02	25 637	99.67
Tunisia	6	0.02	25 643	99.69
Finland	5	0.02	25 648	99.71
United Arab Emirates	5	0.02	25 653	99.73
Yemen	5	0.02	25 658	99.75
Congo, Dem. Rep. Of The	4	0.02	25 662	99.76
Fiji	4	0.02	25666	99.78
Latvia	4	0.02	25 670	99.79
Saint Lucia	4	0.02	25 674	99.81
Antigua And Barbuda	3	0.01	25 677	99.82
Hong Kong	3	0.01	25 680	99.83
Malawi	3	0.01	25 683	99.84
Oman	3	0.01	25 686	99.86
Saint Kitts And Nevis	3	0.01	25 689	99.87
Eritrea	2	0.01	25 691	99.88
Estonia	2	0.01	25 693	99.88
Madagascar	2	0.01	25 695	99.89
Maldives	2	0.01	25 697	99.9
Mauritius	2	0.01	25 699	99.91
North Yemen	2	0.01	25 701	99.91
Qatar	2	0.01	25 703	99.92
British Antarctic Territory	1	0	25 704	99.93
Cambodia	1	0	25 705	99.93
Chad	1	0	25 706	99.93
Comoros	1	0	25 707	99.94
Congo, Rep. Of The	1	0	25 708	99.94
Dutch East Indies	1	0	25 709	99.95
French Guiana	1	0	25 710	99.95
Guinea	1	0	25 711	99.95
Guinea-Bissau	1	0	25 712	99.96
Malta	1	0	25 713	99.96

Citizenship at Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
Mauritania	1	0	25 714	99.97
Niger	1	0	25 715	99.97
Rwanda	1	0	25 716	99.97
Senegal	1	0	25 717	99.98
Serbia And Montenegro	1	0	25 718	99.98
Slovenia	1	0	25 719	99.98
Stateless	1	0	25 720	99.99
Suriname	1	0	25 721	99.99
Swaziland	1	0	25 722	100
Turkmenistan	1	0	25 723	100
TOTAL IMGs			**25 723**	
TOTAL RESIDENTS		**98 183**		

Source: 2005 AMA Masterfile

Table 20b: IMG Residents 2004-2005 by Country of Medical School, All Years

Country of Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
India	6 203	24.09	6 203	24.09
Pakistan	1 937	7.52	8 140	31.62
Grenada	1 426	5.54	9 566	37.16
Dominica	1 360	5.28	10 926	42.44
Philippines	983	3.82	11 909	46.26
Netherlands Antilles	827	3.21	12 736	49.47
China	811	3.15	13 547	52.62
Mexico	707	2.75	14 254	55.37
Nigeria	579	2.25	14 833	57.62
Syria	532	2.07	15 365	59.68
Israel	487	1.89	15 852	61.57
Iran	482	1.87	16 334	63.45
Colombia	473	1.84	16 807	65.28
Russia	467	1.81	17 274	67.10
Romania	457	1.78	17 731	68.87
Egypt	449	1.74	18 180	70.62
Dominican Republic	414	1.61	18 594	72.22
Lebanon	408	1.58	19 002	73.81
Germany	357	1.39	19 359	75.20
Poland	310	1.20	19 669	76.40
Ireland	271	1.05	19 940	77.45
Argentina	248	0.96	20 188	78.42
Hungary	218	0.85	20 406	79.26
Jordan	217	0.84	20 623	80.10
Bangladesh	215	0.84	20 838	80.94

Country of Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
Ukraine	204	0.79	21 042	81.73
Venezuela	192	0.75	21 234	82.48
Cuba	187	0.73	21 421	83.20
Brazil	169	0.66	21 590	83.86
Peru	165	0.64	21 755	84.50
United Kingdom	164	0.64	21 919	85.14
Turkey	148	0.57	22 067	85.71
Korea, South	137	0.53	22 204	86.25
Japan	127	0.49	22 331	86.74
Myanmar (Burma)	123	0.48	22 454	87.22
Iraq	108	0.42	22 562	87.64
Bulgaria	107	0.42	22 669	88.05
Ethiopia	103	0.40	22 772	88.45
Costa Rica	102	0.40	22 874	88.85
Australia	100	0.39	22 974	89.24
Italy	97	0.38	23 071	89.61
Ghana.	95 0	37	23 166	89.98
Cayman Islands	89	0.35	23 255	90.33
Jamaica	89	0.35	23 344	90.67
Thailand	89	0.35	23 433	91.02
Belize	86	0.33	23 519	91.35
Greece	85	0.33	23 604	91.68
Trinidad And Tobago	83	0.32	23 687	92.01
Sudan	76	0.30	23 763	92.30
Saint Kitts And Nevis	74	0.29	23 837	92.59
South Africa	67	0.26	23 904	92.85
Ecuador	64	0.25	23 968	93.10
Armenia	63	0.24	24 031	93.34
Saint Lucia	62	0.24	24 093	93.58
Serbia And Montenegro	59	0.23	24 152	93.81
Sri Lanka	57	0.22	24 209	94.03
Czech Republic	56	0.22	24 265	94.25
Nepal	56	0.22	24 321	94.47
Belarus	52	0.20	24 373	94.67
Lithuania	50	0.19	24 423	94.87
Uzbekistan	50	0.19	24 473	95.06
Croatia	45	0.17	24 518	95.23
Georgia	45	0.17	24 563	95.41
Spain	43	0.17	24 606	95.58
Austria	42	0.16	24 648	95.74
Uganda	41	0.16	24 689	95.90
Slovakia	38	0.15	24 727	96.05
Kenya	37	0.14	24 764	96.19
Bosnia And Herzegovina	33	0.13	24 797	96.32

Country of Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
Haiti	33	0.13	24 830	96.45
Vietnam	32	0.12	24 862	96.57
Albania	31	0.12	24 893	96.69
France	31	0.12	24 924	96.81
Morocco	31	0.12	24 955	96.93
United States Of America	31	0.12	24 986	97.05
Libya	30	0.12	25 016	97.17
Sweden	30	0.12	25 046	97.28
Guatemala	28	0.11	25 074	97.39
El Salvador	26	0.10	25 100	97.49
Algeria	25	0.10	25 125	97.59
Iceland	25	0.10	25 150	97.69
Switzerland	24	0.09	25 174	97.78
Antigua And Barbuda	23	0.09	25 197	97.87
Chile	23	0.09	25 220	97.96
Panama	23	0.09	25 243	98.05
Indonesia	22	0.09	25 265	98.14
Moldova	22	0.09	25 287	98.22
Azerbaijan	21	0.08	25 308	98.30
Bolivia	20	0.08	25 328	98.38
Senegal	20	0.08	25 348	98.46
Taiwan	19	0.07	25 367	98.53
Zimbabwe	19	0.07	25 386	98.61
Saudi Arabia	18	0.07	25 404	98.68
Denmark	17	0.07	25 421	98.74
Paraguay	17	0.07	25 438	98.81
Belgium	16	0.06	25 454	98.87
Honduras	16	0.06	25 470	98.93
Latvia	16	0.06	25 486	98.99
Netherlands	16	0.06	25 502	99.06
Nicaragua	16	0.06	25 518	99.12
Kazakhstan	15	0.06	25 533	99.18
Afghanistan	13	0.05	25 546	99.23
Singapore	12	0.05	25 558	99.27
Barbados	11	0.04	25 569	99.32
Zambia	11	0.04	25 580	99.36
Cameroon	10	0.04	25 590	99.40
New Zealand	10	0.04	25 600	99.44
Cook Islands	9	0.03	25 609	99.47
Macedonia	9	0.03	25 618	99.51
Tunisia	9	0.03	25 627	99.54
Hong Kong	8	0.03	25 635	99.57
Kuwait	8	0.03	25 643	99.60
Kyrgyzstan	8	0.03	25 651	99.63

Country of Medical School	Frequency	Percent	Cumulative frequency	Cumulative percent
Tajikistan	8	0.03	25 659	99.67
United Arab Emirates	8	0.03	25 667	99.70
Uruguay	8	0.03	25 675	99.73
Guyana	7	0.03	25 682	99.76
Liberia	7	0.03	25 689	99.78
Norway	7	0.03	25 696	99.81
Yemen	5	0.02	25 701	99.83
Bahrain	4	0.02	25 705	99.84
Finland	4	0.02	25 709	99.86
Fiji	3	0.01	25 712	99.87
Malawi	3	0.01	25 715	99.88
Malaysia	3	0.01	25 718	99.90
Malta	3	0.01	25 721	99.91
Portugal	3	0.01	25 724	99.92
Sierra Leone	3	0.01	25 727	99.93
Slovenia	3	0.01	25 730	99.94
Congo, Dem. Rep. Of The	2	0.01	25 732	99.95
Estonia	2	0.01	25 734	99.96
Niger	2	0.01	25 736	99.97
Tanzania	2	0.01	25 738	99.97
Guinea	1	0.00	25 739	99.98
Madagascar	1	0.00	25 740	99.98
Micronesia, Federated States	1	0.00	25 741	99.98
Occupied Palestinian Territory	1	0.00	25 742	99.99
Rwanda	1	0.00	25 743	99.99
Somalia	1	0.00	25 744	100.00
Turkmenistan	1	0.00	25 745	100.00
TOTAL IMGS			**254 745**	
TOTAL RESIDENTS		**98 183**		

Source: 2005 AMA Masterfile

Citizenship of Foreign-IMGs.

62. The series of tables that follows attempts to characterize the national origin of IMGs who serve as residents and those who remain in practice in the US. Table 19 lists IMG residents by their citizenship at the time of medical school during the years 1995 through 2002, grouped by region or other common characteristics. The largest number was from south Asia, particularly India. The second largest group was US citizens who attended medical school outside of the US (US-IMGs), a group that has progressively increased in number and that will soon approach 3 000, double the number in 2002. Developing countries accounted for most of the remaining residents, while Western Europe, Canada and Australia/New Zealand combined accounted for fewer than 10%.

63. Table 20 provides greater detail concerning IMG residents in all years of residency during 2004-2005. Consistent with the citizenship of PGY-1 residents in earlier years (Table 19), India and Pakistan accounted for 30% and the US for 22% of IMG residents in 2004. The remaining 50% were citizens of 160

other countries, 1/3 of which contributed fewer than 10 residents (Table 20A). India and Pakistan were also the countries that trained the most residents (31% of all IMGs), and 20% (mainly US citizens) were trained in the Caribbean. In all, IMG residents attended medical schools in 140 countries (Table 20B).

Table 21: Foreign-IMG Physicians Completing USMLE Step 3: Country of Citizenship at Completion of Medical School, 1994-2004

Anglophone Countries		%	**Indian Subcontinent**		%	**Central/South America**		%
UK	907	1.57%	India	16 531	28.58%	Columbia	1 051	1.82%
Australia	198	0.34%	Pakistan	4 435	7.67%	Mexico	534	0.92%
Ireland	308	0.53%	Bangladesh	613	1.06%	Peru	518	0.90%
Canada	720	1.24%	Sri Lanka	292	0.50%	Argentina	464	0.80%
New Zealand	49	0.08%	Nepal	192	0.33%	Brazil	443	0.77%
Total	**2 182**	**3.77%**	**Total**	**22 063**	**38.14%**	Cuba	433	0.75%
						Venezuela	420	0.73%
Western Europe		0.00%	**Middle East**		0.00%	Dominican Republic	319	0.55%
Germany	1 007	1.74%	Syria	1 380	2.39%	Haiti	184	0.32%
Czechoslovakia	257	0.44%	Iran	1 376	2.38%	Jamaica	156	0.27%
Italy	287	0.50%	Lebanon	987	1.71%	Ecuador	148	0.26%
Greece	283	0.49%	Jordan	614	1.06%	Trinidad/Tobago	130	0.22%
Spain	178	0.31%	Turkey	506	0.87%	Guatemala	113	0.20%
Switzerland	100	0.17%	Iraq	375	0.65%	Panama	104	0.18%
France	109	0.19%	Israel	294	0.51%	Other Central/South America	496	0.86%
Other Western Europe	494	0.85%	Other Middle East	309	0.53%	Total	5 513	9.53%
Total	**2 715**	**4.69%**	**Total**	**5 841**	**10.10%**			
						North Africa		0.00%
USSR + Central/Eastern Europe		0.00%	**Far East**		0.00%	Egypt	1 519	2.63%
FSU	2 749	4.75%	China	3 497	6.05%	Ethiopia	295	0.51%
Romania	1 432	2.48%	Philippines	2 759	4.77%	Sudan	161	0.28%
Poland	787	1.36%	Burma (Myanmar)	422	0.73%	Other North Africa	251	0.43%
Yugoslavia	478	0.83%	Korea	388	0.67%	Total	2 226	3.85%
Bulgaria	302	0.52%	Japan	318	0.55%			
Hungary	255	0.44%	Thailand	254	0.44%	**Sub-Saharan Africa**		0.00%
Other Cent/E Europe	293	0.51%	Taiwan	140	0.24%	Nigeria	1 642	2.84%
Total	**6 296**	**10.88%**	Malaysia	134	0.23%	Ghana	363	0.63%
			Vietnam	127	0.22%	South Africa	303	0.52%
			Other Far East	227	0.39%	Other Sub-Saharan Africa	432	0.75%
			Total	**8 266**	**14.29%**	**Total**	**2 740**	4.74%

Countries with more than 100 licensees listed

Source: Educational Commission on Foreign Medical Graduates, Philadelphia, PA.

Table 22: IMG Physicians Licensed (1994-2004) and in the AMA Masterfile (2004): Country of Citizenship at Completion of Medical School (residents included)

Country of Origin	Number in AMA Masterfile 2004*	%	Number Licensed 1994-2005**	%
India	40 838	22.6%	16 531	29%
Philippines	17 873	9.9%	2 759	4.8%
Pakistan	9 667	5.3%	4 435	7.8%
Canada	8 990	5%	720	1.3%
China	6 687	3.7%	3 497	6.1%
Former USSR	5 060	2.8%	2 749	4.8%
Egypt	4 593	2.5%	1 519	2.7%
Mexico	4 578	2.5%	534	0.9%
South Korea	4 401	2.4%	388	0.7%
Iran	4 002	2.2%	1 376	2.4%
United Kingdom	3 439	1.9%	907	1.6%
Dominican Republic	3 232	1.8%	319	0.6%
Syria	3 219	1.8%	1 380	2.4%
Germany	3 071	1.7%	1 007	1.8%
Lebanon	2 556	1.4%	987	1.7%
Nigeria	2 392	1.3%	1 642	2.9%
Argentina	2 374	1.3%	464	0.8%
Poland	2 365	1.3%	787	1.4%
Colombia	2 362	1.3%	1 051	1.8%
Other	24 000	13.3%	14 790	25.9%
TOTAL	**155 699**		**57 842**	

*from F. Mullan, N Engl J Med 2005; 353:1810-8.

**number passing USMLE Step 3 from ECFMG

IMGs Completing Licensure in the US

64. Table 21 displays the country of citizenship at time of medical school for foreign-IMG physicians who completed USMLE Step 3 (and therefore qualified for licensure) over the period from 1994 through 2005. As was the case for those entering training, the largest percent (38%) was from the Indian sub-continent. Contributions from other regions included 14% from the Middle East and North Africa, 14% from the Far East (1/3 of whom came from the Philippines), 11% from Eastern Europe and the Former Soviet Union, 10% from Central and South America, 5% from sub-Saharan Africa, 5% from Western Europe and 4% from the developed Anglophone countries (UK, Canada, Australia and New Zealand).

65. Table 22 attempts to answer the question of how many of the foreign-IMGs who were qualified for licensure actually practiced in the US. As in Table 21, it categorizes physicians in terms of their citizenship when they completed medical school. Only the top nineteen countries are shown. Two forms of data are displayed. First is the number of physicians from the top 19 countries who completed Step 3 of the USMLE exam during the most recent decade (1994 to 2005), as shown in greater detail in Table 6. Second

is the number of active physicians in the AMA Masterfile who were citizens of these 19 countries, irrespective of when they were licensed, therefore including physicians who entered the Masterfile three and four decades ago. The percentage of IMGs from India and Pakistan in the group that completed training during the more recent period was higher than the entire group (37% vs. 28%), as was true of IMGs from the Former Soviet Union (4.8% vs. 2.8%) and China (6.1% vs. 3.7%), but the percentage was lower in the more recent period for IMGs from the Philippines (4.8% vs. 9.9%), Canada (1.3% vs. 5.3%) and Mexico (0.9% vs. 2.5%), while most other countries continued their historic level of participation.

Table 23: IMGs Remaining in Practice in the US in 2003

Country	Not in AMA Masterfile	In AMA Masterfile				Percent in AMA Masterfile
		Residents	Active Physicians	Not Classified	Total	
USA	3 924	4 371	14 942	1 883	21 196	84%
China	1 353	1 483	1 168	627	3 278	71%
Columbia	524	353	593	169	1 115	68%
Egypt	1 324	658	1 366	348	2 372	64%
Germany	3 233	433	521	272	1 226	27%
India	8 203	5 787	12 230	2 128	20 145	71%
Italy	630	133	406	134	673	52%
Japan	715	117	125	105	347	33%
Korea	723	81	270	67	418	37%
Lebanon	631	455	955	195	1 605	72%
Mexico	417	205	558	165	928	69%
Nigeria	1 100	526	1 078	207	1 811	62%
Pakistan	2 710	1 829	3 714	882	6 425	70%
Philippines	2 219	819	3 724	739	5 282	70%
Romania	647	598	654	177	1 429	69%
Syria	596	634	1 455	198	2 287	79%
Taiwan	791	50	326	62	438	36%
Turkey	692	248	312	163	723	51%
UK	1 701	284	924	270	1 478	46%
FSU	1 200	1 176	2 017	562	3 755	76%
Other	18 383	6 028	14 123	4 340	24 491	57%
Total Foreign	47 792	21 897	46 519	11 810	80 226	63%

Source: Norcini, Boulet, McKinley and Cooper, 2006

IMGs in Practice

66. Table 23 is another means of looking at the persistence of foreign-IMGs in the US. It examines the question of how many IMGs who entered the AMA Masterfile over the period from 1980 through 2000 were still in the Masterfile in 2003. Overall, 84% of US-IMGs were active in 2003, while 63% of foreign-IMGs were active. The percentages were lowest (30-50%) for physicians from developed countries (Germany, Japan, Italy, Taiwan, Korea and the UK), suggesting that physicians from these countries came to the US primarily for training and did not intend to immigrate, whereas approximately 70% of physicians from developing countries were active in the US. Assuming that the figure of 84% for US citizens

represents natural attrition, it can be reasoned that approximately 85% of foreign-IMGs immigrate to the US.

67. The states with the highest percentage of physicians who are IMGs are New York and New Jersey (40%), followed by Florida and Illinois (33%) and Connecticut, Maryland, Michigan and Ohio (25%). Specialties with the most IMGs are Internal Medicine, Psychiatry, Anesthesiology and Pediatrics, with approximately 30% in each. Family Medicine has traditionally included relatively few IMGs. However, in association with the declining interest of US graduates in Family Medicine over the past few years, the percentage that are IMGs has climbed steeply and, for the past few years has been greater than 50%. In contrast, fewer than 20% of recent general surgery, dermatology and radiology residents were IMGs.

68. While there are cultural issues confronting IMGs who practice in the US, they are not unlike the issues that confront other immigrants in a nation with many immigrants. These include issues of acculturation and subtle discrimination in the workplace. Language proficiency is an important matter for IMG physicians and is specifically tested as a part of the USMLE exam. Some problems affecting IMGs relate to the fact that many are older than USMGs when they complete training and they often have family responsibilities.

69. A great deal of attention has been addressed to the question of the comparative quality of USMGs and IMGs. Overall, foreign-IMGs are adjudged to be of good quality. However, their performance on the USMLE exam is poorer than the performance of USMGs and a smaller percent are certified by specialty boards. Of the 100 medical schools whose graduates have the highest frequency of disciplinary actions, 70% are foreign. On the other hand, foreign-IMGs perform better on the internal medicine board exam and on in-service exams.

IMGs Serving in J-1 Waiver Programs

70. To aid in recruiting physicians for underserved areas, the federal government has established a J-1 Visa Waiver Program for J-1 visa holders who have completed residency and would otherwise have to return to their home countries. Such physicians must serve for three years in a Health Professions Shortage Areas (HPSAs), usually in one of the primary care disciplines, which for this purpose includes family practice, internal medicine, general pediatrics, OB/GYN, and psychiatry. HPSAs are defined as areas with a ratio of population to full-time-equivalent primary care physicians of at least 3 500:1 or, if less than 3 500:1 but greater than 3 000:1, an area that has unusually high needs for primary care services or insufficient capacity of existing primary care providers. In recent years, the J-1 Visa Waiver Program has also been open to physicians from other specialties that are also in short supply in these same areas. Each state is allowed to recommend 30 waivers per year to the U.S. Department of State and the Bureau of Citizenship and Immigration Services (BCIS, formerly known as the Immigration and Naturalization Service, or INS). In addition, the Department of Health and Human Services and recommends waivers, a task it undertook when the Department of Agriculture, which had been the major responsible organization, ceased its involvement in 2002. Waivers may also be recommended by the Appalachian Regional Council.

71. In 2004, physicians who were serving their J-1 waiver obligation comprised more than 20% of the physicians in health centres located in isolated communities and almost 7% of those in urban health centres. While employers tend to be satisfied, physicians often view the working conditions and compensation as unfair, and retention rates beyond service are low. Moreover, while the various route to waivers have the capacity to accommodate more than 2 000 J-1 holders yearly, the total number of J-1 visa holders has fallen well below this number, as more hospitals offer incoming residents access to H1B visas, a route that is more complex for hospitals but preferred by residents, thereby placing such hospitals at a competitive advantage. The total number of residents in all years of training who were on J-1 visas has

fallen from more 10 000 during in the period from 1996 to 1999 to fewer than 6 000 in 2006. In 2005, only 896 physicians sought J-1 waivers. This set of circumstances has created a crisis for many rural communities that have relied upon J-1 visa waiver holders to provide needed services.

VI. RECRUITMENT AND RETENTION

72. Unlike the situation in Britain and Canada, where IMG physicians who have completed training elsewhere may enter the country and be licensed without further training, licensure in the US requires that physicians serve a residency in the US, regardless of whether they completed residency training elsewhere. There are rare exceptions to this rule. One example is a state law that allows a limited number of Mexican physicians to practice in underserved areas of California. Another is licensure granted by exception to physicians of international renown. But these exceptions affect very small numbers of physicians. Therefore, unlike the situation now affecting the recruitment of foreign nurses to the US, there are no efforts to recruit foreign physicians into the US.

73. IMGs are more likely to locate in states that require fewer years of residency in order to qualify for licensure, and they are more likely to locate in communities where there are already large numbers of IMGs. Hispanic and Asian physicians are more likely to locate in communities where larger numbers of these ethnic groups reside. As indicated above, residents who trained under J-1 visas are permitted to remain in the US if they serve in designated underserved areas for three years. However, few remain in these areas after completing their service. Indeed, fewer IMGs than USMGs practice in rural areas, and more locate to urban areas.

74. Many states have formal efforts to recruit physicians (IMG and USMG) to underserved areas, particularly rural areas. The federal government assists in these efforts through the J-1 Visa Waiver Program, discussed above, and through the National Health Service Corps, which offers scholarships or repays student loans in exchange for service in underserved rural and urban areas. Some states also offer loan repayment in exchange for service to underserved communities. A higher percentage of IMGs than USMGs serve medically underserved populations. This is particularly true in psychiatry, where a disproportionate number of IMGs work in public institutions rather than in community practice.

75. As the physician shortages have deepened in the US, recruitment efforts have intensified at the level of hospitals and practice groups, often with the help of commercial recruitment agencies. Indeed, physician recruitment is a major industry, with approximately 8 000 recruiters, a number that is 1/3 the number of residents who complete training each year. Advertising for physicians is a major revenue source for leading medical journals. Recruitment costs often exceed $20 000. The greatest recruitment intensity is in specialties that treat adults and that have evolved technologically, such as cardiology, dermatology, radiology, orthopedic surgery, urology, gastroenterology and oncology. Until recently, there has been relatively less demand in family medicine and general internal medicine. However, this latter situation has changed over the past year, and there has been a large increase in the number of primary care physicians being recruited.

Brain Drain

76. Even without active recruitment, concern about the impact of physician immigration on donor countries exists, yet there is no national effort to identify the issues and address them (9, 42). To that end, a retreat was held at the University of Pennsylvania in April 2006. It began with the recognition that the English-speaking world is on the cusp of substantial shortages of physicians, nurses and other health care workers. The US, which employs half of all nurses and physicians in English-speaking countries, is facing

possible deficits of as many as 800 000 nurses and 200 000 physicians by 2020-2025. The crisis in developing countries is numerically smaller but proportionally greater, and it is exacerbated by the migration of physicians and nurses from these countries to the US and other developed countries. These dynamics underscore the reality of global interdependence in health human resources, and they call upon the US and other developed countries to embrace the principles of national self-sufficiency and global responsibility. They also challenge those who recognize these principles to develop the political will in the US to incorporate them into national policy. The retreat concluded by calling for greater "self-sufficiency" in medicine and nursing through approaches such as the eight that follow:

1. Expand the core educational capacity for baccalaureate and graduate nursing and for undergraduate and graduate medical education.

2. Begin to develop cadres of faculty who will be necessary for an expansion of educational capacity.

3. Convene panels of experts who can identify the issues that must be addressed in order to accomplish the needed growth of educational capacity.

4. Emphasize the central roles of knowledge and adaptability in educating nurses and physicians to practice in tomorrow's health care environment.

5. Recognizing that it may be impossible to increase the output of physicians at a pace that will eliminate future shortages, begin to model the necessary reconfigurations of the health care workforce that can meet population needs.

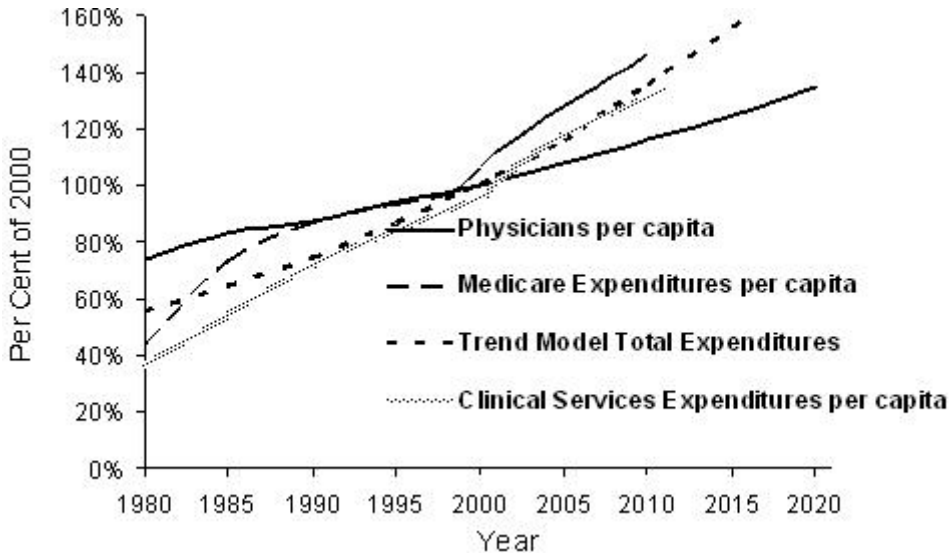
6. Focus attention on the inter-professional nature of self-sufficiency, and expand the capacity for training nurse practitioners, physician assistants and other health professionals at high skill levels.

7. Invest in re-engineering the workplace for physicians and nurses through innovations in the processes of care, simplification of regulation and promotion of team care.

8. Use the opportunity of expansion and innovation in nursing and medical education to address pressing social needs, including increased diversity of the health care workforce and decreased geographic imbalances in the access to health care services.

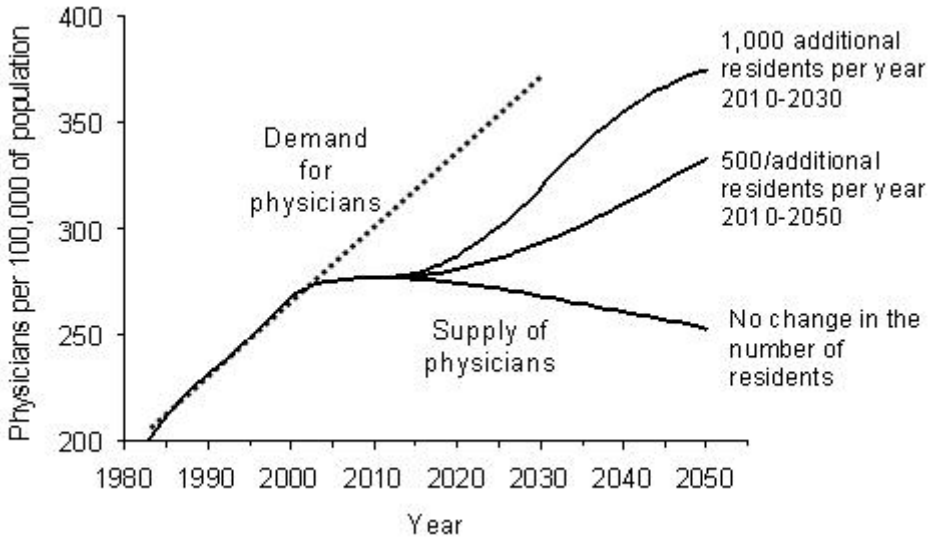
77. While those assembled voiced enthusiasm for approaches such as these, at present there is no national will to see them through.

Figure 10: Expenditures for Clinical Services and the Demand for Physicians



Source: Cooper, et al. Health Affairs, 2002; 21(1): 140-154; Smith, et al. Health Affairs, 2006; 25(1): 186-196

Figure 11: Effects of Increasing GME on Future Supply-Demand Imbalance



Source: Author's calculations

Future Demand and the Projected Recruitment of IMGs.

78. There is a general consensus that health care expenditures and the demand for physicians will continue to increase (Figure 10). Figure 11 displays the gap that will occur between supply and demand if the rate of entry of physicians into the workforce is not increased. My colleagues and I have proposed that, to begin to correct future deficits in the number of physicians, the current number of approximately 25 500 PGY-1 residents must be increased by 1 000 residents each year starting in 2010 to achieve 35 000 PGY-1

positions in 2020. This would yield a 40% increase over the current rate of training, an increment that seems almost unattainable but is identical to the increment in GME that accompanied medical school expansion in the 1970s and 1980s. Yet even that rate of increase will not correct the projected shortage (Figure 11). How will the migration of physicians to the US be affected as the US struggles to correct its deficit of physicians?

- Scenario 1: If residencies are expanded but medical schools within the US are not expanded to the same degree, there will be more opportunity for IMGs to enter US residency programs.

- Scenario 2: If medical schools are expanded proportionately but there are too few qualified applicants, there will be opportunities for foreign students to obtain their medical education in the US and continue into GME.

- Scenario 3: Regardless of how much expansion occurs in GME, if the physician shortages deepen, pressure will mount to change the requirement that foreign physicians receive residency training in the US and, like the UK and Canada, licensed physicians who have completed training in other countries could be directly admitted to practice.

79. At present, there is no organized effort to expand GME, yet several states have instituted ways to increase health care spending among the underserved. California has proposed a $12B increase. Were all states to enact such reform measures, health care utilization could rise by 5-10% above the natural rise that is a consequence of economic growth and the development of new technologies. This creates a collision course between the expectations of the public and the capacity of training programs to produce enough physicians to respond to the future demand. With too few physicians, maximal efforts will be made to train paraprofessionals who can undertake portions of the service that physicians would otherwise provide, but there are limitations to how much can be delegated to non-physicians. Indeed, there is no avenue through which these future needs can be met except through immigration. It seems inevitable that decades of failed planning in the US will result in an excessive drain of physicians from elsewhere in the world, particularly from developing countries. Recognition of this reality is important for health care planning throughout the English speaking world.

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