

# Trends in Career Choice by US Medical School Graduates

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**S**IGNIFICANT CHANGES HAVE OCCURRED in medical student career choice in recent years. The most notable example is the recent decrease in the percentage of US medical school graduates choosing a primary care career. Trends in career choice ultimately have a significant influence on the availability of an appropriate physician workforce for the US public. The purpose of this article is to review and highlight temporal trends in career choice by graduates of allopathic US medical schools, focusing on US medical doctors (USMDs) entering residencies from 1987.

## METHODS

Data sources used include the Association of American Medical Colleges Graduation Questionnaire (AAMC GQ), the National Resident Matching Program (NRMP), and the national Graduate Medical Education (GME) census. These databases were used to review temporal trends in the number of USMDs entering residencies in primary care, general or subspecialty surgical, and non-primary care and non-surgical specialties from 1987 to 2002. The AAMC GQ is an online questionnaire given to fourth-year students at US medical schools.<sup>1</sup> The NRMP, better known as the match, reports the numbers of medical school graduates matching into each specialty's residency programs.<sup>2</sup> The American Medical Association has surveyed residency programs annually to solicit information

**See also Patient Page.**

**Context** Trends in career choice among specialties have varied greatly. Most notable is the recent decrease in the percentage of US medical student graduates choosing a primary care career, which has important implications for the US physician workforce.

**Objective** To review temporal trends in career choice by graduates of allopathic US medical schools, focusing on US medical doctors entering residencies since 1987.

**Data Sources** Three databases, the Association of American Medical Colleges Graduation Questionnaire (AAMC GQ), the National Resident Matching Program, and the national Graduate Medical Education census, were used to review temporal trends in the number of US medical doctors entering residencies in primary care, general or subspecialty surgical, and non-primary care and nonsurgical specialties from 1987 to 2002.

**Data Synthesis** In 1987, 49.2% of all medical school graduates matched to one of the generalist residencies (internal medicine, pediatrics, or family medicine). The percentage of students matching to primary care specialties declined in the early 1990s, peaked at 53.2% in 1998, and declined to 44.2% in 2002. Concurrent with the latter decline, AAMC GQ data showed a decrease in medical student interest in primary care careers (35.6% in 1999 to 21.5% in 2002). The total percentage of US medical doctors matching to general or subspecialty surgical residencies remained stable at 11% to 12% from 1987 to 2002. During this same period, emergency medicine and plastic surgery increased as a match choice, while anesthesiology, pathology, and psychiatry were more variable over time.

**Conclusions** Distribution of medical students' career choices among specialties varied considerably from 1987 to 2002. The debate will continue regarding the appropriate specialty mix within the physician workforce.

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about numbers and characteristics of all residents in training.<sup>3-5</sup> This recently became an online survey (GME census) sponsored jointly by the American Medical Association and AAMC.<sup>6</sup>

## RESULTS

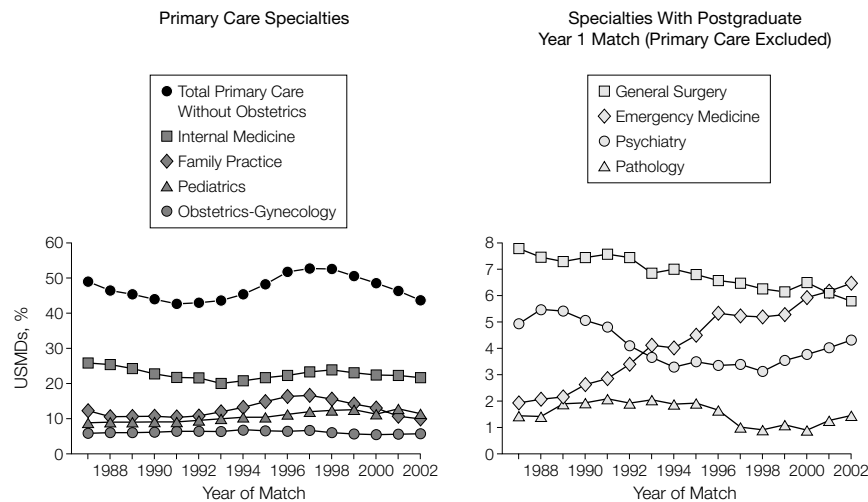
### Primary Care Careers

Since the late 1980s, there have been dramatic shifts in the number of USMDs entering residencies in primary care. In 1987, 49.2% of all medical school graduates matched a generalist residency in internal medicine, family medicine, or pediatrics (FIGURE). This percentage decreased steadily to a low of 43.1% by 1991. The decline for internal medicine continued for 2 more years, resulting in the largest absolute

decline of the primary care specialties from 26.5% (1987) to 20.8% (1993). There was a similar steady decline in interest in family medicine during this period as well from 12.7% (1987) to 10.6% (1991). During this time, the trend toward decreasing numbers of USMDs matching to primary care residencies did not affect the pediatric match, with the percentage remaining steady at about 10% each year.

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**Figure.** Percentage of US Medical Doctors (USMDs) Matching to Specialty, 1987-2002

Data from National Resident Matching Program.<sup>2</sup> Trends for the primary care specialties and trends for non-primary care specialties that have residency entry usually beginning in the first year after medical school. Data presented do not include match data for all specialties or for combined training programs.

As a result of this decline in the early 1990s and with the increased numbers of USMDs choosing to subspecialize, there was growing concern about an undersupply of primary care physicians and an overabundance of subspecialists. Consequently, efforts to expose students to generalist practice and foster interest in primary care were supported by several foundations and federal grant programs.<sup>7</sup> In addition, general perceptions about the improved market for primary care physicians, perhaps because of the increased role for primary care physicians in the managed care environment, may have also fostered an increased interest in these fields among medical students.<sup>8</sup> As a result of these and other factors, the downward trend in student primary care specialty interest reversed in 1993. By 1998, the percentage of students matching to residencies in internal medicine, pediatrics, and family practice had reached a peak of 53.2%, surpassing the percentage of a decade earlier.

After peaking in 1998, primary care career choice began to decline (44.2% in 2002). For the past 5 years, there has been a decrease in students matching to residencies in internal medicine

(24.3% in 1998 to 21.8% in 2002) and family medicine (16.0% to 10.4%), with a smaller decrease for pediatrics (12.9% to 12.0%). Although a smaller contributor to the overall number of primary care physicians, combined internal medicine/pediatric residencies also had a decrease during this same period (2.7% to 2.2%).<sup>2</sup>

The numbers of students matching to these residencies overestimates the numbers that will enter primary care practice. Many residents in internal medicine, pediatrics, and a smaller number in family practice will opt to pursue fellowship training and subspecialization. Compared with 1999, students in 2002 were 1.4 times more likely on the AAMC GQ to indicate an interest in pursuing internal medicine subspecialty fellowships and 1.5 times more likely to pursue pediatrics subspecialty training.<sup>1</sup> The AAMC GQ data also confirm the decreased medical student interest in primary care careers from 35.6% (1999) to 21.5% (2002), predicting an even greater decline than indicated by the NRMP numbers.

Several reasons have been suggested to explain this recent decrease in student primary care interest. The future market for primary care physi-

cians may be decreasing because of an increase in the provision of primary care by nurse practitioners and physician assistants in the office setting and by hospitalists in the inpatient setting. Conversely, the job market for subspecialists may be improving, largely because of the increased prevalence of conditions requiring specialty care and the increased use of medical technology.<sup>9</sup> Decreased career satisfaction of primary care physicians,<sup>10</sup> declining income, and the widening gap in reimbursement between subspecialists and primary care physicians may all be influencing career choice.<sup>8,11</sup>

More stability in medical student career choice has been evident in obstetrics and gynecology, which is an alternate career choice for students interested in surgical practice and primary care. The numbers of students matching to obstetrics and gynecology residencies have remained relatively stable during the last 15 years with roughly 6% to 8% of students matching to these residencies each year.<sup>2</sup> However, AAMC GQ data from 1999 to 2002 show a 20% decrease in student interest in primary care obstetrics and gynecology compared with subspecialty obstetrics or gynecology.<sup>1</sup> During that brief period, the percentage of students interested in the subspecialties of obstetrics and gynecology doubled (0.9% to 1.7%).

### General Surgery and Surgical Subspecialties

Using the most recent 16 years of NRMP data, the total percentage of USMDs matching to general or subspecialty surgical residencies has remained stable at 11% to 12%.<sup>2</sup> However, fewer medical students chose general surgery as a career with a slow decline from 7.8% (1987) to 5.8% (2002) (Figure). With approximately 14 500 graduating students from US allopathic medical schools each year, that decrease represents almost 300 fewer future general surgeons entering training each year, raising concerns about an inadequate general surgery workforce.<sup>2,12</sup> Some of these positions, however, are filled by in-

ternational medical graduates. The decrease in USMDs training in general surgery may be even more significant when considering the high attrition rate (20% in 2000) from general surgical residencies.<sup>13</sup> Because surgical residents have traditionally worked more hours per week than trainees in other specialties, some of this attrition may be related to lifestyle issues during residency. It is too soon to predict what the effect of new rules limiting resident work hours will have on career decisions and attrition from surgical training. Other potential influences on the recent trends in surgical career choice include the impact of technical developments, such as laparoscopic and robotic surgery, and competition for procedures with other specialists (eg, invasive radiologists and gastroenterologists).

The GME data show relative stability in the number of trainees in several surgical subspecialties (neurosurgery, otolaryngology, plastic surgery, urology) (TABLE). The numbers of students matching to orthopedic surgery residency programs increased from 2.5% to almost 4%.<sup>2</sup> Conversely, the small recent decrease in numbers of residents in cardiothoracic surgery has raised concerns about an inadequate future workforce in this vital subspecialty.<sup>14</sup>

### Non-Primary Care and Nonsurgical Specialties

During the last 16 years, emergency medicine has shown the most consistent increase in matches of USMDs. In 1987, less than 2% of students matched this career.<sup>2</sup> By 2002, this percentage had increased to 6.4% of USMDs. In contrast, psychiatry declined from more than 5% in the late 1980s to 3.1% in 1998, followed by a gradual increase to 4.2% in 2002.<sup>2</sup> The numbers of students with pathology career plans also gradually increased in the early- to mid-1990s.<sup>2</sup> This reversed during the late 1990s as the number of trainees matching in pathology decreased by half to only 1% of USMDs. The most recent match data show a rebound to 1.5% (Figure).

Anesthesiology has undergone a cycle of increase followed by a sharp de-

**Table.** Specialties With Delayed Residency Entry by Year of Survey\*

Specialty	No. of Total Trainees			
	1987 <sup>5</sup>	1992 <sup>3</sup>	1997 <sup>4</sup>	2001 <sup>6</sup>
Anesthesiology	3779	4540	2094	2232
Dermatology	761	826	806	838
Neurology	1110	882	698	674
Physical medicine and rehabilitation	702	875	837	494
Radiology-diagnostic	3168	3838	3387	3091
Radiation oncology	460	NA	405	343
Surgical subspecialties				
Neurosurgery	689	651	773	699
Ophthalmology	1489	1505	1354	1127
Orthopedic surgery	2686	2810	2719	2877
Otolaryngology	1069	1047	1140	1021
Plastic surgery	363	417	441	461
Cardiothoracic surgery	268	285	278	228
Urology	961	957	1024	915

Abbreviation: NA, not available.

\*Delayed residency entry indicates numbers of US medical doctors training (total of all postgraduate years) in each residency program.

cline as a career choice during the period considered. During the early 1990s, almost 2% of USMDs matched to anesthesiology residencies.<sup>2</sup> This percentage decreased to only 0.3% in the match of 1996 but has since increased to 2.3% in 2002.<sup>2</sup> Physical medicine and rehabilitation match data also show a remarkable decrease in numbers through the late 1990s and into the early 2000s followed by an appreciable rebound in 2002.<sup>2</sup> As expected, the lowest point of many of these other specialties coincided with the peak interest in primary care careers.

The numbers of USMDs matching in radiology peaked in 1993, decreased during the late 1990s, and recently have rebounded somewhat. The latter was fueled in part by a significant increase in medical student interest (AAMC GQ) in radiology careers, increasing from 3.9% in 1996 to 6.6% in 2002.<sup>1</sup> According to the GME survey, the number of USMDs training in diagnostic radiology is still 19% below the peak of a decade earlier.<sup>3-6,15</sup> The numbers of trainees in neurology decreased almost by half between 1987 and 2001.<sup>3-6</sup> Albeit with much smaller numbers, this downward trend has been duplicated by radiation oncology (Table).<sup>3-6</sup>

The number of USMDs training in dermatology increased modestly dur-

ing the 1980s but has been relatively stable during the past decade.<sup>3-6</sup> This belies the increase in interest in dermatology by fourth-year medical students with AAMC GQ career choice increasing from 1.6% in 1996 to 2.5% in 2002.<sup>1</sup> This suggests that these residency positions are highly competitive and many students with a dermatology career goal do not attain it.

A similar cycle occurred in both transitional and preliminary internal medicine residency positions (restricted to postgraduate year 1). Although the content of these 2 residencies is somewhat different, they are both routes to further training in a number of other specialties or subspecialties. United States medical doctors matching transitional positions decreased from more than 7% in the late 1980s to 4.1% in 1996, followed by an increase to 6.6% in 2002.<sup>2</sup> Preliminary internal medicine residency positions filled in the match peaked at 10.8% in 1991 and decreased to 6.2% in 1997 with a rebound to 10.4% in 2002.<sup>2</sup> Determining the ultimate career choice of these physicians is especially difficult because transitional and preliminary internal medicine residents can use their training as a springboard for further training in a variety of fields such as radiology, ophthalmology, dermatol-

ogy, anesthesiology, physical medicine and rehabilitation, psychiatry, or neurology.

A new and rapidly growing career choice is that of hospitalist. During the past decade, increasing numbers of physicians are choosing to provide care restricted to hospitalized patients. Most hospitalists are trained in internal medicine with some trained in family medicine, combined internal medicine/pediatrics, or pediatrics. The Society of Hospital Medicine now estimates that between 7000 and 8000 physicians deserve this appellation.<sup>16</sup> It is our perception that this career choice may be more attractive because of job availability, a controlled lifestyle (shift work), and attractive salaries. Hospital administrators may seek out hospitalists because of data suggesting shorter hospital stays with equal or better patient outcomes.<sup>17</sup>

Concern has also been expressed about the numbers of physician-scientists being trained.<sup>18,19</sup> During the past decade, the percentage of USMDs interested in significant (>25% time) or exclusive research careers has decreased by approximately 16%.<sup>1</sup> In 2002, only 0.9% of medical school graduates received combined MD/PhD degrees, down from 2.3% only 5 years earlier.<sup>2</sup> This decreased interest in research careers has occurred in both sexes but is more notable for female physicians and for schools with high levels of National Institute of Health funding.<sup>2,18</sup> This trend has obvious implications for future research in fields that integrate clinical and basic sciences.

## COMMENT

During the last decade and a half, the distribution of medical student career choices among specialties has varied greatly. The trends in primary care have fluctuated, decreasing steeply from 1987 until 1993, followed by record increases until 1998, and then declining again during the last 5 years. Interest in anesthesiology, radiology, pathology, physical medicine and rehabilitation, and similar fields has been inversely related to student interest in primary care.

Many of these fields are now experiencing a resurgence in popularity as interest in primary care wanes. Although the total percentage of students matching to surgical subspecialty residencies has remained stable during this period, there has been a gradual decline in students matching to general surgery as a career. Since 1987, emergency medicine and plastic surgery have shown consistent growth.

Our intent was to track the career choice trends of graduates from allopathic medical schools within the United States. In addition, between 40% and 50% of the 2500 osteopathic medical students enter allopathic residencies each year and are included in the GME data.<sup>3-6</sup> Although contributing greatly to the US medical workforce, it was beyond the scope of this report to track osteopathic graduates who entered osteopathic residencies or graduates from international medical schools who train in US residency programs. It is important to recognize that international medical graduates fill more than 25% of all US residency positions<sup>3-6</sup> and provide a significant proportion of US health care.

The databases included in this review have some inherent limitations. The AAMC GQ reports student career preference<sup>1</sup>; however, a senior student may not match to his or her desired specialty. Although the data from the NRMP show the number of students matching to a given residency at 1 point,<sup>2</sup> residents may switch specialty training programs, fail to complete a residency, or use preliminary or transitional training programs as the route to further training. The final database, the GME census, is an attempt to enumerate the numbers of residents training in each residency and fellowship program in the United States.<sup>3-6</sup> Although comprehensive in scope, some residency programs do not respond to this survey or provide complete data, thereby somewhat limiting accuracy. All of these databases have made changes in item questions and data format during the past 15 years, making comparisons over time more difficult.

With the continuing evolution of health care delivery in the United States

along with advances in medical technology, the debate will continue about the appropriate specialty mix within the physician workforce. Although none of the available databases capture all physicians or all career choices, reviewing career choice trends provides important information needed to plan educational programs, set funding priorities, and plan for the provision of adequate health care.

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## REFERENCES

1. *Medical School Graduation Questionnaire*. Washington, DC: Association of American Medical Colleges; 2003.
2. *National Resident Matching Program Results and Data*. Washington, DC: National Resident Matching Program; 2003.
3. American Medical Association. Graduate medical education (appendix II). *JAMA*. 1993;270:1116-1122.
4. American Medical Association. Graduate medical education (appendix II). *JAMA*. 1998;280:836-845.
5. Crowley AE, Etzel SI. Graduate medical education in the United States. *JAMA*. 1988;260:1093-1101.
6. American Medical Association. Graduate medical education (appendix II). *JAMA*. 2002;288:1151-1164.
7. Whitcomb M. Primary care medicine in the United States: where are we headed? *Acad Med*. 2002;77:759-760.
8. Schroeder S. Primary care at a crossroads. *Acad Med*. 2002;77:767-773.
9. Cooper RA. There's a shortage of specialists: is anyone listening? *Acad Med*. 2002;77:761-766.
10. Wetterneck T, Linzer M, McMurray JD, et al. Worklife and satisfaction of general internists. *Arch Intern Med*. 2002;162:649-656.
11. Landon B, Reschovsky J, Blumenthal D. Changes in career satisfaction among primary care and specialist physicians, 1997-2001. *JAMA*. 2003;289:442-449.
12. Richardson JD. Workforce and lifestyle issues in general surgery training and practice. *Arch Surg*. 2002;137:515-520.
13. Neumayer LA, Cochran A, Melby S, Foy HM, Wallack MK. The state of general surgery residency in the United States: program director perspectives, 2001. *Arch Surg*. 2002;137:1262-1265.
14. Adams D. Cardiac surgeon shortage likely if low residency trend continues. *American Medical News*. August 26, 2002;45:9-12.
15. Status of the medical oncology workforce: the American Society of Clinical Oncology [comment]. *J Clin Oncol*. 1996;14:2612-2621.
16. Society of Hospital Medicine. Available at: <http://www.hospitalmedicine.org/presentation/apps/indlist/intro.asp?area=mediacenter&flag=13>. Accessed August 11, 2003.
17. Wachter RM, Goldman L. The hospitalist movement 5 years later. *JAMA*. 2002;287:487-494.
18. Guelich JM, Singer BH, Castro MC, Rosenberg LE. A gender gap in the next generation of physician-scientists: medical student interest and participation in research. *J Invest Med*. 2002;50:412-418.
19. Rosenberg LE. The physician-scientist: an essential and fragile link in the medical research chain. *J Clin Invest*. 1999;103:1621-1626.