

Contemporary Trends in Student Selection of Medical Specialties

The Potential Impact on General Surgery

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Hypothesis: Lifestyle is a priority among senior medical students when selecting a career specialty. The trend toward controllable lifestyle vs noncontrollable lifestyle specialties is affecting the number of students desiring a career in general surgery.

Design: The Medical Student Graduation Questionnaire is published and distributed by the Association of American Medical Colleges to all US medical schools for senior medical students to complete before graduation. The results from the survey are published each year in the All Schools Report. We evaluated these reports to track the percentage of students pursuing a career in general surgery during the past decade. The National Resident Matching Program also publishes a report each year outlining the match results. We reviewed these results from 1978 through 2001 and used them to determine the percentage of students choosing to enter general surgery.

Main Outcome Measures: First choice of specialty among graduating senior students from US medical schools; positions matched by US and foreign medical students and students from osteopathic medical schools; factors that influenced the decision-making process in

choice of specialty; and factors that influenced students to change their mind from one career to another.

Results: An established trend of decreasing interest in general surgery exists and has the potential to affect the number of positions that are filled each year in the match. Linear projections confirm that, should the current trend continue (negative slope; $P = .01$), by 2005 only 4.8% of US graduating senior medical students will be interested in general surgery. This established trend of decreasing interest in general surgery, which began in the early 1980s, did not affect the match until 2001, when the number of positions offered exceeded the number of students interested in general surgery. At present, the specialty of general surgery is at risk for significant numbers of positions remaining unfilled. Our match projections estimate that for 2005, only 76.6% of positions will be filled by US senior students (negative slope; $P = .001$).

Conclusions: If the trend continues, the students matching in general surgery will not be as competitive as in years past, and there will be a potential shortage of these specialists in the United States.

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DRAMATIC CHANGES have occurred in the field of medicine during the past 2 decades. In every aspect—from research and education to organization and practice—medicine has undergone significant alteration. New advances have been commensurate with new levels of strain and uncertainty. In particular, a significant addition to the number of women and minority students entering medical careers has occurred. However, society and government policy have continued to exert profound influence on students to enter primary care medicine, and the pressures exerted by business, insurance, and legal interests have only increased.

Many theories attempt to explain why the number of applications to medical schools has decreased during the past few years. Perhaps medicine is no longer as financially rewarding as in years past; perhaps the prestige associated with becoming a physician has diminished. Some believe that medicine is losing not only its prestige and nobility but also the personal rewards physicians experience in caring for patients. Many fear that medicine is being sacrificed by lawsuits or by distrust, as patients consult the Internet for answers.

On the other hand, is it the high cost of medical school and the fact that so many students must contract burdensome debts? Is it that the “yuppie” generation and “generation X” are more interested in instant

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MATERIALS AND METHODS

In an effort to identify trends in specialty choices among graduating senior medical students in the United States, we reviewed the Medical School Graduation Questionnaire (MSGQ)¹ published by the Association of American Medical Colleges. Each year at graduation, senior medical students complete this survey, which queries many aspects of medical education, including students' first choice of specialty. The results are published in the yearly All Schools Report.

The second source of the data that we evaluated is published by the National Resident Matching Program (NRMP),² which outlines the results of the annual student residency match for all specialties. The results were reviewed from 1978 through 2001. Because of differences in reporting certain specialties, the data set was divided into 2 cohorts, 1978 to 1989 and 1990 to 2001. Data reviewed from 1978 to 1989 combined the preliminary year and the categorical slots, whereas data from 1990 to 2001 reported the number of positions offered for general surgery and the preliminary year separately. The later group of results was used in interpreting the current trend, as this period was considered to provide more accurate information with respect to students' intentions of their career paths. Orthopedics was reported consistently from 1978 to 2001, and all of the information reviewed was thought to be applicable. Other specialties such as emergency medicine have reduced periods because they were not reported in the match results before 1983. Furthermore, specialties such as anesthesiology and radiology, which require a transitional year before the commencement of training proper, are reported as positions filled by second-year postgraduate students; these results were not reported in the tables before 1990.

We calculated projections of the MSGQ and NRMP data using linear regression models. The MSGQ results were plotted as the percentage of US senior medical students whose first choice of residency on graduation is general surgery. The NRMP data were plotted as the actual number of students and as a percentage of positions matched. The linear projections were plotted, beginning with the year 1994 and ending at 2005. We performed the analyses using Microsoft Excel 2000 (Microsoft Corp, Redmond, Wash) and SAS version 8.02 (SAS Institute Inc, Cary, NC).

gratification, financially and in terms of time for leisure, whereas medical education and subsequent practice demand delayed gratification?

In the current generation of young professionals, graduates of medical programs appear to be choosing careers that provide large incomes relative to the length of their training and preparation. Perhaps these careers are being chosen for all the right reasons, ie, because practitioners want to care for patients and receive the personal rewards of the privilege of practicing medicine, not just because of the prestige and status once afforded the profession. However, a similar shift in priorities is being

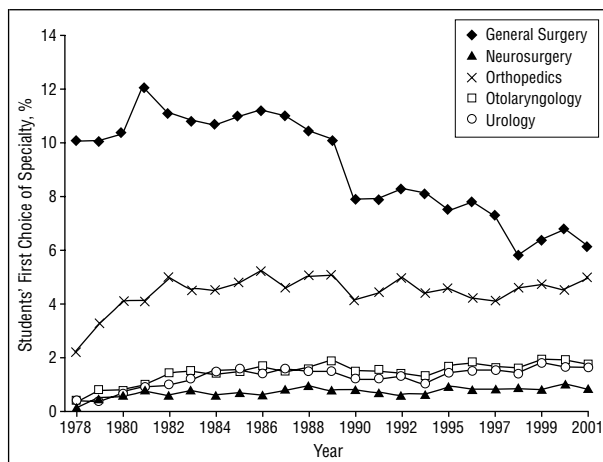


Figure 1. Data extracted from the 1978-2001 Medical Student Graduation Questionnaire All Schools Report, excluding 1993 (unavailable). Data represent US senior students' first choice of residency on graduation and are expressed as a percentage of the respondents each year for the listed surgical specialties.

observed with respect to medical specialties that provide controllable lifestyle (CL). These CL specialties have become increasingly popular among senior medical students choosing a residency.

To continue to meet the demand for general surgeons, medical educators and residency program directors need to apprehend trends in specialty choice and what these trends portend for the future of the profession. Family medicine, internal medicine, pediatrics, and surgery have shown a declining number of applicants; other areas of medicine such as anesthesia, dermatology, radiology, emergency medicine, pathology, ophthalmology, and neurology have shown increased interest. Multiple studies suggest that lifestyle issues are of primacy in the decision-making process for senior medical students when pursuing a specialty. Other factors that have traditionally influenced medical students' choice of careers (eg, specialty content, prestige, and financial remuneration) are now being replaced by considerations of the length of training, the number of hours on call, the likelihood of litigation, and the expectant control they will have as practitioners over their occupational work hours.

In light of the growing concern about these trends by our surgical colleagues, we set out to determine the following: (1) current trends in applications by students to general surgery residency programs; (2) the impact that these trends might have on the specialty of general surgery in the future; and (3) the best use of the knowledge gained of students' concerns to benefit surgical residency programs in assisting them to positively influence medical students' career decisions.

RESULTS

Results from 1978 through 2001, except for the year 1993, were available for analysis. General surgery was found to have a peak level of interest in 1981, when 12.1% of senior medical students selected it as their first choice of specialty (**Figure 1**). In 1989, the percentage dropped to 10%, then to 8% the following year. This trend con-

tinued with a downward slope to 6.1% in the 2001 match. When we evaluated other surgical specialties, orthopedics, urology, and otolaryngology have sustained interest and have an overall increase in students desiring to pursue them since 1978. Neurosurgery has been slightly more variable but continued to show sustained interest during the past 8 years (Figure 1).¹

We also examined the data regarding family practice as an indicator of primary care. The trend seemed to be one of decreasing interest from 1978 to 1992. It had a dramatic renewal of attraction in the early 1990s, peaking in 1997 at 17.6% of graduating senior students. This increased interest fell to roughly 10% of matches last year (Figure 2). Three medical specialties that offer a CL, ie, radiology, anesthesiology, and emergency medicine, have all shown increasing student interest among US senior students from 1978 to 2001 (Figure 2).¹

The question of influence for a variety of factors with an impact on students' decision-making processes was asked on the MSGQ. Responses were rated on a scale of 0 (no influence) to 4 (major influence). For the 1990s, students ranked the "type of patient problems encountered" as having the greatest influence in their decision of the specialty they wished to pursue. The second most influential factors were "clerkships in the area," "intellectual content of the specialty," and "challenging diagnostic problems." The third most influential factor was "example of a physician in the specialty," which we interpreted to be the role model identified by the student. Other influential factors included "possess special skills/talents unique to the specialty" and "predictable work hours." The least influential factors identified by senior students were "level of educational debt," "length of residency," "lack of overcrowding in the field," "prestige within the medical profession," and "good income." These factors remained the dominant influences among the choices presented in the survey for the 1990s (Table 1). We noted that 41.2% of students reported making their decision after or during the third year of medical school. Of these, 20.0% chose in the fourth year. Approximately 14% made their respective specialty choice before entering medical school.¹

The MSGQ also examines how many students seriously considered one specialty and then chose a different career path. For 1990 through 1996, students were asked about the specialty they sought and dropped, in addition to general questions about why the change was made (Table 2). In 1990, 58.9% of respondents (6358 students) to the MSGQ considered pursuing another specialty but changed their minds; of those, 944 students chose to pursue a specialty other than general surgery. This finding corresponds to a 51.2% loss of students who were initially interested in general surgery.

For 1994, 57.0% of respondents (7347 students) changed their mind regarding specialty selection. Of this number, 1100 students opted not to pursue general surgery, accounting for a drop of 51.4%. This trend continued to range from a low of 38.8% to a high of 57.8% of students who were initially interested in general surgery but who eventually chose another specialty (Table 2). Reasons offered by students who chose a specialty other than general surgery were "unpredictable work hours" first and "too demanding of time and effort" sec-

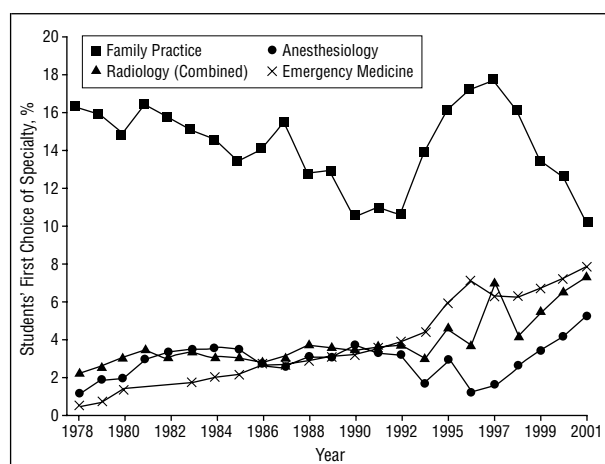


Figure 2. Data extracted from the 1978-2001 Medical Student Graduation Questionnaire All Schools Report, excluding 1993 (unavailable). Data represent US senior medical students' first choice of residency on graduation and are expressed as a percentage of the respondents each year for the listed nonsurgical specialties.

Table 1. Factors Influencing Senior Students Choosing a Specialty*

Influences	Mean Score
5 Most influential	
Type of patient problems encountered	3.3
Clerkships in the area	3.2
Intellectual content of the specialty	3.2
Challenging diagnostic problems	3.2
Example of physician in the specialty	3.1
Possess special skills/talents unique to the specialty	3.0
Predictable work hours	2.0
5 Least influential	
Level of educational debt	0.8
Length of residency	1.3
Lack of overcrowding in the field	1.4
Prestige within the medical profession	1.5
Good income	1.8

*From data published in the All Schools Report of the Medical School Graduation Questionnaire year 1990; the responses remained consistent from 1990-1996 and represent the influences on students in the 1990s. The values were calculated according to the scale of 0 (no influence) to 4 (major influence).

ond. The third reason was equally divided among "too much stress," "type of patient problems," and "length of residency."

On reviewing the NRMP's match results during the past 12 years,² the number of positions filled remained high, despite the decline in the ability of general surgery to attract competitive students. However, the number of positions filled for 2001 suggests an interesting trend in the number of unfilled/unmatched positions. The 2001 match confirmed that 93.4% of positions offered were filled (including US and foreign students), down from 98.5% in 2000. This is the lowest filled-match percentage seen to date. The US senior medical students who matched in general surgery during the past 11 years have decreased from 85.4% (1990) to 78.7% (2001). This trend indicates that more categorical positions are being filled by foreign medical graduates and osteopathic physi-

Table 2. Students Who Were Initially Interested in General Surgery but Changed Their Minds*

Year	Total No. (%) of Students Who Changed Their Minds to Pursue Another Specialty	Total No. of Students Expressing Interest in General Surgery During Medical School	Total No. (%) of Students Who Changed Their Minds From General Surgery to Pursue Another Specialty
1990	6358 (58.9)	1844	944 (51.2)
1991	4375 (39.7)	1501	612 (40.8)
1992	4565 (39.4)	1612	626 (38.8)
1994	7347 (57.0)	2138	1100 (51.4)
1995	8493 (63.7)	2295	1330 (58.8)
1996	7819 (59.4)	2149	1153 (53.7)

*Data were extracted from the responses to questions asked in the Medical School Graduation Questionnaire during the years 1990-1996, excluding 1993 (data unavailable) and published in the All Schools Reports. (The questions have ceased to be asked since 1996.) The total number of students expressing interest in general surgery was calculated by adding the number of students whose first choice of specialty was general surgery to the number of students who changed their minds from general surgery to pursue another career.

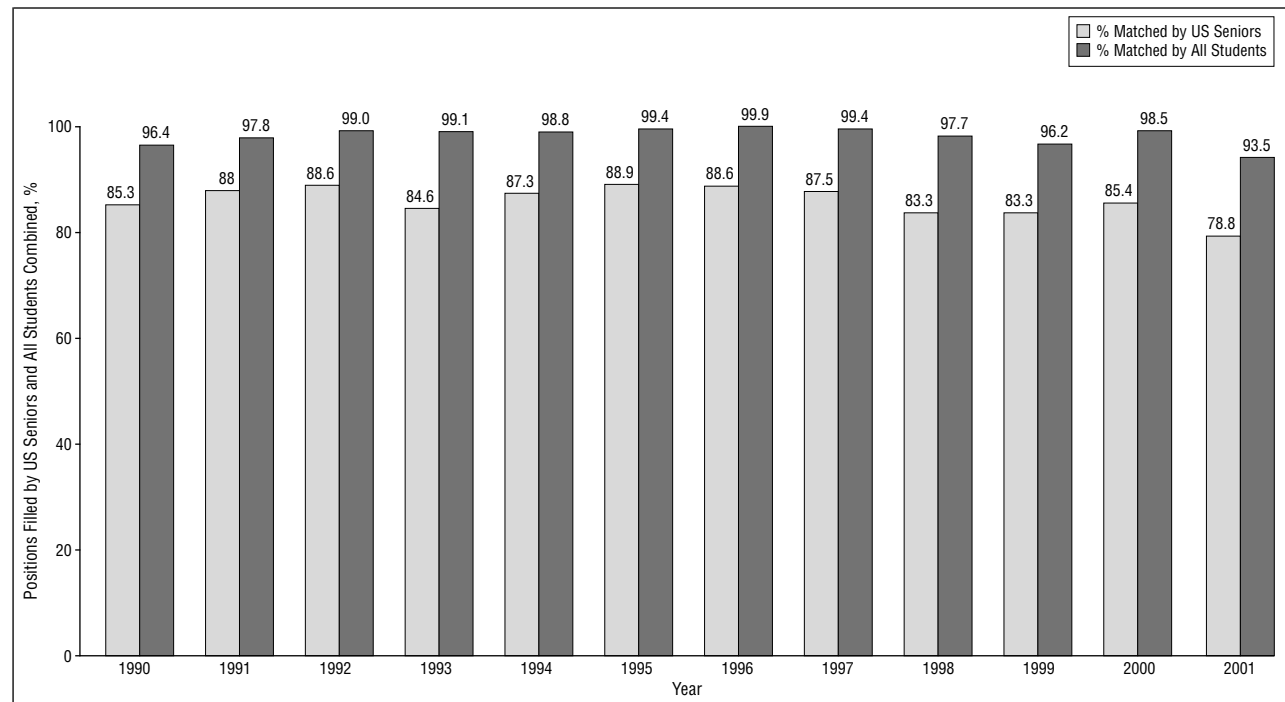


Figure 3. Data extracted from the 1990-2001 National Resident Matching Program results. Data represent the number of general surgery positions filled by US senior medical students and all students combined (foreign medical graduates, osteopathic students, and other physicians).

cians. For the past 3 years, the number of general surgery positions offered to first-year postgraduate students has increased (1009 positions in 1999; 1041 positions in 2001). This decrease in US senior students matching in the specialty cannot entirely be explained by the increase in number of positions offered (**Figure 3**).

To determine the influence of CL issues as a significant factor in choice of a medical career, the NRMP results were examined to evaluate the specialties of radiology, emergency medicine, and anesthesiology.² Anesthesiology has had a cyclic match history during the past 10 years, following a trend of influence by health maintenance organizations to temporarily reduce the workforce. In 1990, 84.3% of positions were filled, and that number fell to 29.6% in 1996. Thereafter, an increasing interest was evident, with 87.4% of positions offered being filled in the 2001 match (**Figure 4**). Diagnostic radiology has shown a similar course, with a decline from the matches

in the early 1990s to a nadir in 1996 (only 50.0% of positions filled), to recovery in the 2001 match with more than 99.2% of positions filled (**Figure 5**). Emergency medicine has remained stable since appearing in the 1983 match (**Figure 6**). This specialty has consistently filled virtually all of its positions and represents a good example of the popularity of the CL.

We calculated the established trend of prevailing interest in general surgery and extrapolated projections of future interest up to 2005, assuming no alterations occur in current trends. Beginning with the year 1994 and extending through 2001, data from the MSGQ results¹ were used to establish the declining trend; the slope was found to be statistically significant ($P=.01$). This statistical model suggests that for 2005, 4.8% of US senior medical students would pursue general surgery, a significant reduction compared with previous years (**Figure 7**). The effects on the match, if the trend continues, were also

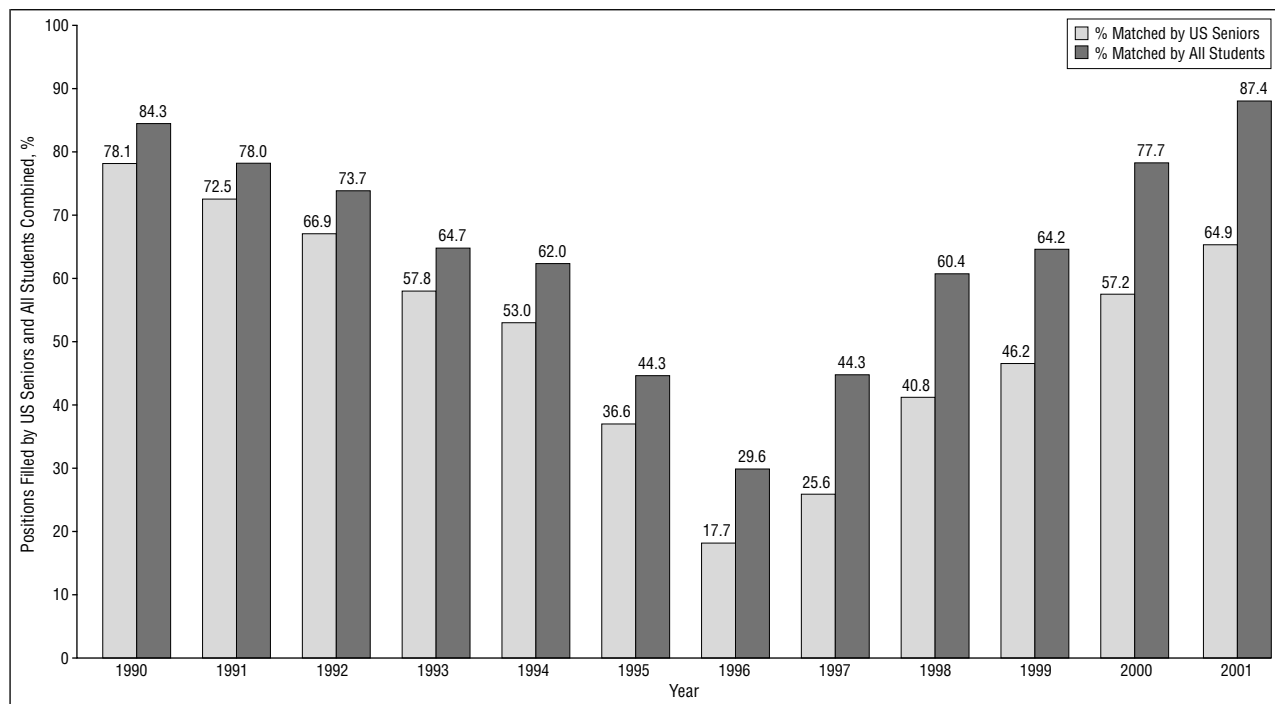


Figure 4. Data extracted from the 1990-2001 National Resident Matching Program results. Data represent the number of positions in anesthesia filled by US senior medical students and all students combined (foreign medical graduates, osteopathic students, and other physicians).

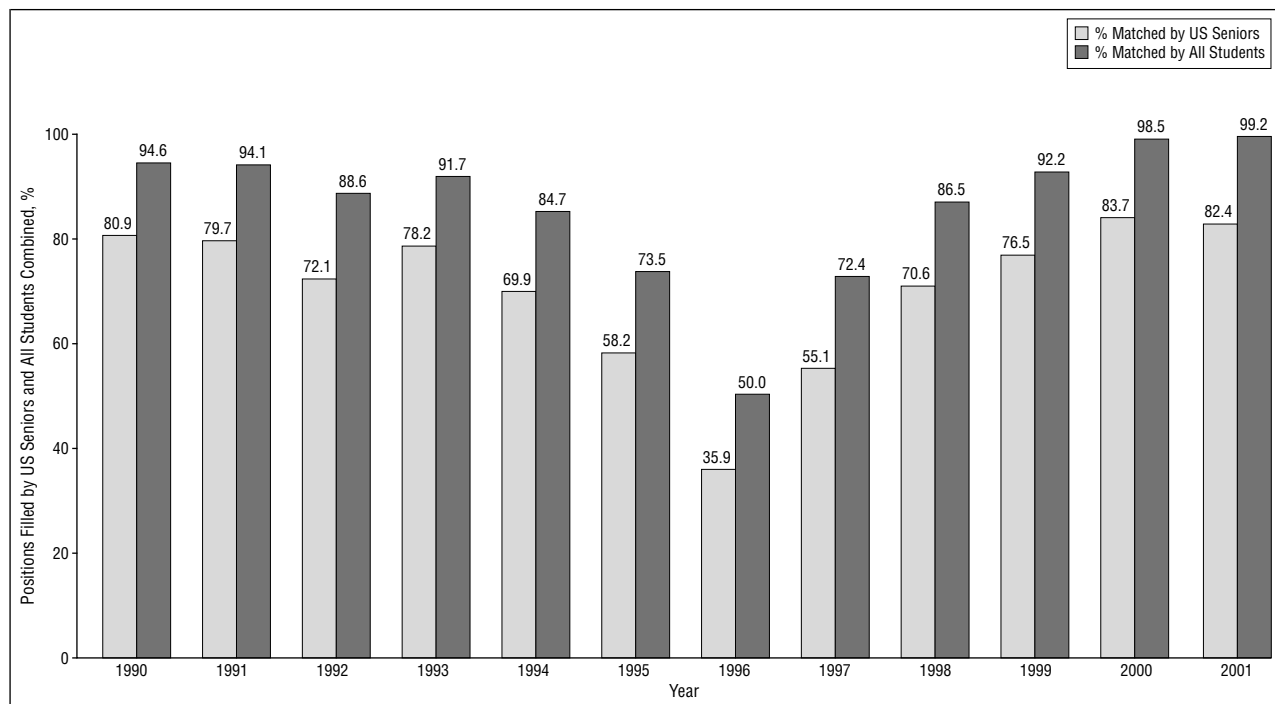


Figure 5. Data extracted from the 1990-2001 National Resident Matching Program results. Data represent the number of positions in diagnostic radiology filled by US senior medical students and all students combined (foreign medical graduates, osteopathic students, and other physicians).

evaluated specifically in terms of actual numbers of US students matching since 1994, as well as the numbers of all students matched. These calculations assume that the number of positions offered remains constant at 1041, and one can verify that all 3 lines diverge with statistically significant slopes ($P=.01$ and $P=.002$). Our projections suggest that in 2005, 774 US students will match,

a 16.6% drop from 928 in 1994 (**Figure 8**). The total number of all students (US and foreign) predicted to match in general surgery in the year 2005 is 940. If the number of positions offered remains constant at 1041, only 76.6% of positions will be filled by US senior students and there will be 100 unmatched positions (**Figure 9**).

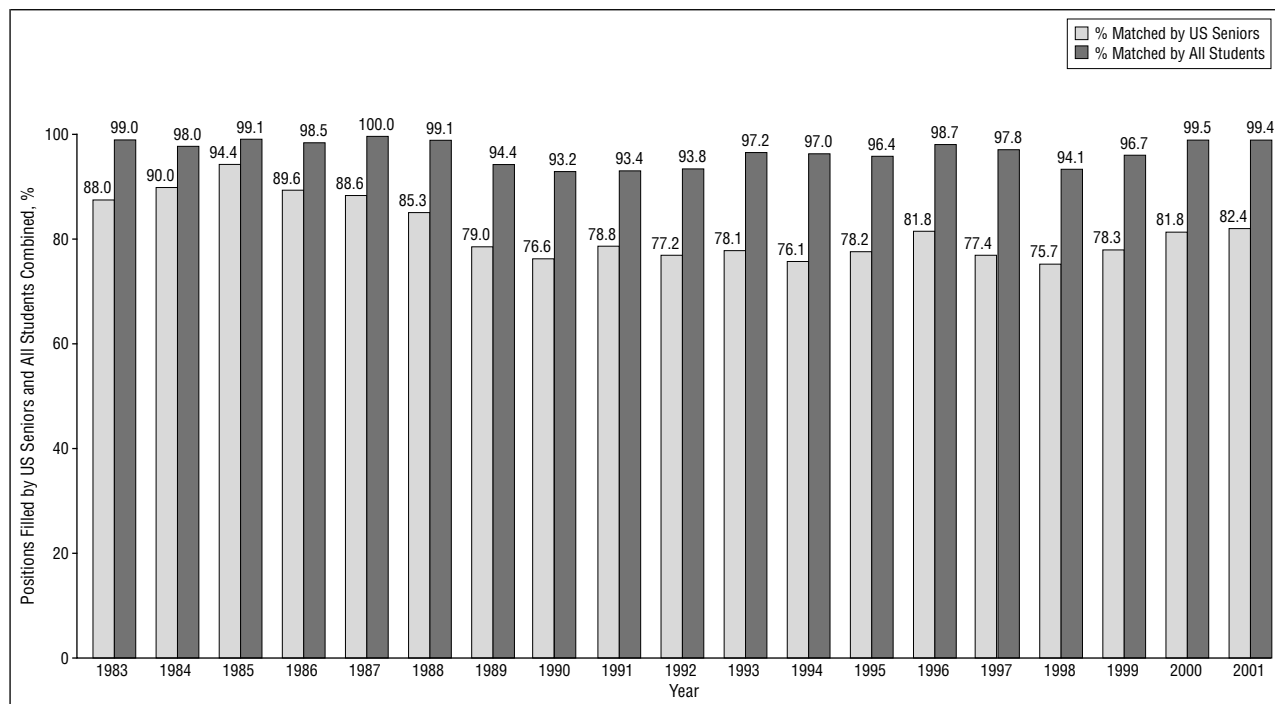


Figure 6. Data extracted from the 1990-2001 National Resident Matching Program results. Data represent the number of positions in emergency medicine filled by US senior medical students and all students combined (foreign medical graduates, osteopathic students, and other physicians).

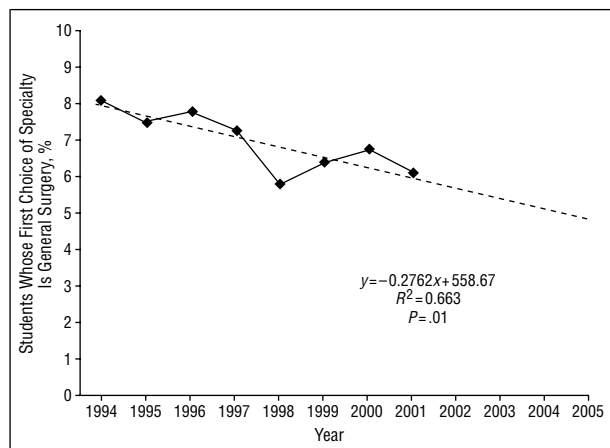


Figure 7. Data extracted from the Medical Student Graduation Questionnaire All Schools Report 1994-2001. Data represent the recent declining trend of medical students' interest in general surgery. The linear projection estimates what the interest level among US senior medical students will be in the year 2005 if the trend continues.

COMMENT

The results of the All Schools Report from 1978 through 2001 suggest a decreasing interest by senior students in general surgery. Some surgical specialties (eg, orthopedics, otolaryngology, and urology) appear to have sustained or even increased interest among students during the past 20 years. Family practice has shown a fluctuating course since 1978, but during the past few years, this specialty has experienced a steady decline. Medical specialties with a CL, such as radiology, anesthesiology, and emergency medicine, have all shown a trend of increasing interest. In addition, many students

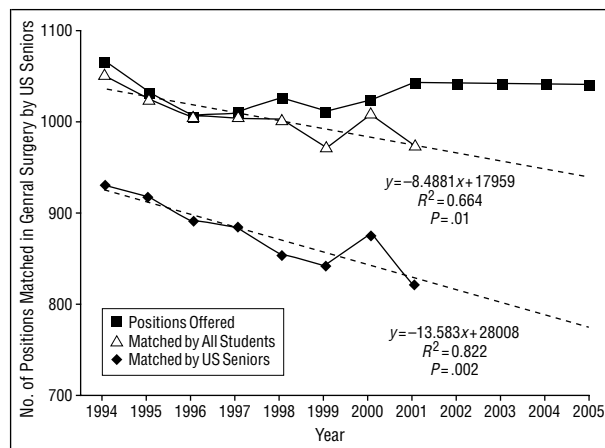


Figure 8. Data extracted from the 1994-2001 National Resident Matching Program results. Data represent the recent trend of medical students' matching in general surgery. The top linear projection represents the number of residency slots that will be matched or filled by all students (foreign medical graduates, osteopathic students, and US senior medical students) participating in the match in the year 2005; the bottom linear projection, the number of positions that will be matched or filled by US senior medical students in the year 2005 if the trend continues and the number of positions offered remains the same.

who were initially attracted to general surgery are changing their minds and pursuing other career paths secondary to concerns about lifestyle. Based on the above findings, these trends likely represent the evolving priorities of the new generation of physicians.

Schwartz et al³ examined the choices of specialty training made by the students of high academic standing (the top 15%) from 3 colleges of medicine. Their study confirmed that top students were selecting specialties with CLs (ie, emergency medicine, dermatology, anesthesiology, ra-

diology, neurology, ophthalmology, pathology, and psychiatry). Areas with non-CLs (ie, family medicine, internal medicine, pediatrics, and general surgery) experienced a declining interest. Primary care specialties had the greatest difficulty in attracting students with high academic standing, whereas choices for general surgery varied among the 3 schools. Since 1970, the American Board of Medical Specialties awarded fewer certificates in the fields of primary care, decreased only slightly its certificates to surgical specialties, and increased the number given to graduates of CL specialties. Tardiff et al⁴ tracked the careers of 12 consecutive classes of students from 1971 to 1982 and determined that 13% of graduates switched from primary care to hospital service specialties such as radiology or pathology. Again, the most important factor leading to changing career pathways involved lifestyle issues. The authors concluded that if the migration of top students to CL specialties continues, "the inevitable result will be a pool of applicants who are average to below average in academic standing who choose primary care because CL specialties are no longer realistic choices for them."

A survey of 346 fourth-year medical students from 9 medical schools examined the 25 influences that students consider to be the most important in the choice of specialty.⁵ Items on the survey were organized into the following 3 major factors: (1) perceived lifestyle factors, including income, personal time, number of call nights, length of residency, and prestige; (2) intellectual and practice activities, including clinical experiences, faculty role models, entrance into academic medicine, and practice in an urban setting; and (3) the altruism factor, which focused on practicing in a rural area, the types of patients to be cared for, opportunities for community service, and nonfaculty physician role models. The authors confirmed that students choosing CL specialties placed greater emphasis on the items associated with the perceived lifestyle factors than did those choosing non-CL specialties and surgery. The non-CL and surgery groups placed less importance on the items described under the cerebral and practice-orientation factors when compared with the CL group, who rated these factors the highest. The CL group rated the altruism factor the lowest, and the non-CL and surgery groups rated it high in regard to the extent that it influenced specialty choice.

Schwartz et al⁶ have studied the effects of lifestyle concerns on students entering surgery careers; they examined the records of the specializations of the graduates of the University of Kentucky College of Medicine, Lexington, from 1975 through 1989. They confirmed that students entered non-CL specialties more often than CL specialties from 1975 to 1983 (81.3% and 18.7%, respectively). From 1984 to 1989, a larger percentage (28.8%) of students entered CL specialties. When general surgery was separated from other non-CL specialties, students not entering general surgery accounted for the shift from non-CL to CL specialties. Primary care remained somewhat stable during the 2 periods, with 62.3% and 59.4% of students, respectively, entering the field (a decrease of 2.9%); whereas the percentage entering surgery decreased 7.1% during the interval from 1984 to 1989. The authors concluded that CL specialties had a "negative effect on entry into surgical training."

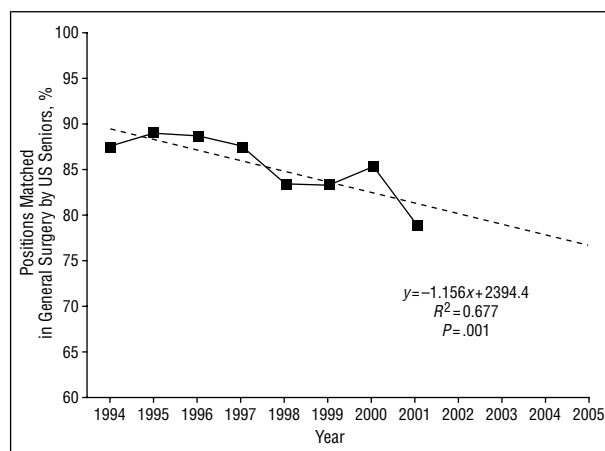


Figure 9. Data extracted from the 1994-2001 National Resident Matching Program results. Data represent the recent trend of medical students' matching in general surgery expressed as a percentage. The linear projection estimates the number of positions that will be matched or filled by US senior medical students in the year 2005 if the trend continues and the number of positions offered remains the same.

In a 1990 editorial, Polk⁷ demonstrated a dramatic decrease in medical graduates choosing to enter surgery careers during the previous 3 years. The number of excellent residencies with unfilled positions increased during the 3 yearly match cycles. Furthermore, a greater number of slots were being filled by non-US graduates. Polk attributed the declining interest to the following 3 factors: (1) the push toward primary care provided by the health care industry and government, which provides financial incentives to students and institutions for producing primary care physicians; (2) in the wake of decreasing reimbursements, the decrease in time devoted by the surgical faculty of American medical schools to serving as mentors and role models for medical students; and (3) the decrease (by 30%) by medical schools of the requisite clerkship experience and students' exposure to surgical sciences. As a consequence, the faculty has failed to demonstrate to students how the physician in private practice can balance professional and personal life. These issues are all the more important because half of medical students today are women, and surgical lifestyle is viewed as one especially difficult to reconcile with family life. This fact results in the failure to recruit half of the available general surgery workforce—something no residency can afford to sustain.

A large percentage (38.8%-57.8%) of students who were initially attracted to the specialty of general surgery later changed their minds for the following reasons having to do with lifestyle issues: unpredictable work hours, demands on time and effort, amount of stress, type of patient problems, and length of residency.

Our data confirm that perceived threats to lifestyle remain an important factor influencing the career choice of medical students. If general surgery is to compete with other specialties in attracting top students, program directors will have to address these issues.

However, concerns such as predictable work hours or whether individuals possess the special talent and skills unique to a particular field are matters over which program directors have little control. With the increasing

complexities of technological advances, there will be even more cognitive demands placed on residents, without an opportunity for the corresponding increase in the duration of residency training time. Students with talents and inclinations specific to surgery should be encouraged by residents and surgical staff to pursue a surgical career. The surgery clerkship experience is also a major influence for students in choosing for and against a specialty. Improvement of the clerkship experience will provide a positive influence for students to choose general surgery; it represents an area where medical school deans can work beneficially to assist surgery program directors. Furthermore, residents have a significant and sustained influence on the career choices of students. Residents who are enthusiastic about their work will provide students with a positive view of the specialty and enable them to identify the "personality of the specialty."

In an attempt to identify and address differences between male and female residents, Gabram et al⁸ performed a survey of 501 surgical residents in the New England area and noted that the top 5 concerns for both sexes were (1) work hours, (2) personal finances, (3) quantity of formal education, (4) quality of formal education, and (5) postponement of family plans. The following 5 items were of more concern to women than to men: (1) availability of role models and mentors, (2) comfort in expressing emotion at work, (3) initiation and maintenance of personal relationships, (4) childbirth during residency, and (5) the postponement of family plans. With the increasing number of women entering the surgical specialties (up by 27%) and the trend toward CL specialties, these issues will become increasingly important as departments of surgery strive to remain competitive and continue to attract top students.

Jonasson and Kwakwa,⁹ in a 1996 longitudinal study of the American College of Surgeons, concluded that: "Fewer general surgeons enter the work force each year. Thus, despite working longer, the total number of years practiced by each cohort of new general surgeons has decreased." Kwakwa and Jonasson¹⁰ also examined the attrition rates of surgical residents who entered residency in 1993, following them in the study until 1998. They confirmed that the overall attrition rate was 12%, a figure they deemed low; nevertheless, this is an area of concern that must be monitored.

The NRMP results from 1990 to 2000 were stable, with an average of 98.4% of general surgery positions filled. However, the 2001 match confirmed only 93.4% of positions filled, a decrease that has provoked concern among surgical educators. Questions arise as to whether the low numbers in the 2001 match are a natural fluctuation or variation, or whether the lower rate accurately reflects and validates the trend seen in the current MSGQ results. In the evaluation of MSGQ data, the decreasing interest in general surgery among students had no effect on the general surgery match regarding the number of positions filled until 2001. Throughout the 1980s, more students desired a career in surgery than positions were available (10% of senior medical students, approximately 1600 students interested in 1000-1100 positions). For 2001, the number of students interested in general surgery (1041) was fewer than the number of positions offered (960 students

[6.0%]; this approximated the number who matched [973 students]). One can infer that the buffer has been exhausted. We must not be complacent; if the trend and interest in CL specialties continues, a negative impact on the workforce of general surgery could result.

One can appreciate the overall increasing interest in CL specialties in Figure 2 from the results of the MSGQ. However, closer observation confirms that there was a decline in the interest in anesthesiology and radiology during the mid-1990s as a consequence of the health maintenance organization debacle. The NRMP validates a significant decline in the number of positions filled in 1996 for both specialties. Explanations for the lack of interest and corresponding unfilled positions probably have to do with the climate of the day and existing apprehension among medical students. During this time, health maintenance organizations, Congress, and local and state governments worked especially hard to promote primary care, emphasizing that students should avoid medical specialties, as the need for them would eventually diminish significantly. Thus, students became reticent about entering these specialties, partly accounting for the cyclic decrease in medical school applications. However, as these fears have not proven to be accurate and the true need for medical specialties has become apparent, these specialties have increased in popularity and competitiveness each year. Are similar rumors or fears about general surgery to blame for the declining interest in surgery? We have no knowledge of this possibility, as the job market for general surgeons is currently enlarging, and the availability of exceptional opportunities for graduating chief residents in surgery remains at an all-time high.

Our calculations project a potentially negative impact on available graduating residents in the specialty if the trend in decreasing interest is sustained. The numbers generated by these calculations are based on the view that government and socioeconomic factors will remain constant; thus, they are an attempt to see effects several years hence. However, the predicted values can be rapidly altered, as in the past, when significant influences are brought to bear from realms of societal or financial pressure. The long-term effects will not become evident for 9 years (4 years of medical school plus 5 years of residency training) and will become more pronounced as demand increases. The "baby boomers" are aging and will, in less than a generation, become the elderly population. As the US population grows, the need for surgeons will inevitably increase. Compounding this problem is the fact that about half of all surgery residents select fellowship training in a different specialty, thus deleting practice opportunities that focus on general surgery.¹¹

We share the concerns of Polk,⁷ who proposed several recommendations to combat the declining interest in surgery by medical students. He suggested various changes to enhance recruitment in general surgery, including the following: (1) in the first- and second-year student curriculum, establish an increased teaching involvement by surgeons in classes of intellectual foundation (eg, physiology and physical diagnosis); (2) increase research opportunities in surgical science during the summer months; (3) encourage surgical volunteer faculty to be role models and organize mentor groups;

Table 3. Recommendations for Program Directors: Enhancement, Lifestyle Issues, and Employment

- I. Enhancement
 - A. Extend invitations to first- and second-year students to surgical grand rounds and special lectureships.
 - B. Form clubs and interest groups with surgical faculty advisors and residents.
 - Meet regularly to educate students about surgery clerkships, residencies, fellowships, and the many rewarding career options in the specialty.
 - Hold seminars on techniques of suturing and wound care.
 - Hold tours of the operating room and other surgical work environments.
 - C. Establish a Web site to provide a locus for information not available with more "official" channels to assist students in coordinating their activities, classes, rotations, and projects.
 - D. The clerkship
 - Provide students with solid knowledge base combined with best practice patterns for demonstration of the technical aspects of patient care management.
 - Maintain focus on acquisition of patient care and operative skills, not in overuse of students for scut work.
- II. Lifestyle issues
 - A. Verify that residency programs comply with Residency Review Committee rules and regulations regarding resident work hours where patient care and resident education are not compromised.
 - B. Differential of practice opportunities
 - Differences between surgical resident's lifestyle and that of a private practice physician or academic surgeon needs to be emphasized to students in their clerkship training.
 - Students should be given the opportunity to "shadow" a private physician in the community to gain exposure to the realistic (and enjoyable) lifestyle pattern of general surgery practice following residency.
 - C. Approximately half of the applicant pool in surgery is female. Issues regarding postponement of family leave need to be addressed, and maternity leave policies may need to be revised.
 - D. Income, reimbursement, and professionalism.
 - Academic and clinical societies representing surgeons need to educate policy makers and legislators of the importance of providing competitive reimbursement for surgeons.
 - Students observe that surgeons frequently have greater work demands compared with other well-reimbursed specialists. Many students would not object to increased work if they are compensated accordingly or shown how the rewards of professional satisfaction outweigh the advantages of financial reimbursement.
 - Stress that competitive reimbursement for surgeons not only reinforces personal comfort but strengthens our society in sustaining a citizenry of skillful and independent professionals.
- III. Employment
 - A. Students and residents should be fully informed concerning employment opportunities in general surgery; in particular, about how this demand is affected by a growing elderly population.
 - B. The need for surgeons should be promoted in a manner commensurate with society's support for primary care physicians. When needs are clearly articulated, students respond.
 - C. It must be stressed to students that a career in general surgery provides many desirable employment opportunities. These opportunities must be emphasized early in medical school to sustain interest in a career in general surgery.

(4) expose students to group practices and the lifestyles of private surgeons; and (5) encourage various surgical organizations to actively address the issue of reductions in reimbursement experienced by surgeons.

We agree with the above recommendations and include additional suggestions in **Table 3** that we hope will assist program directors and medical school admin-

istrators in the quest for training general surgeons to meet the needs of our society.

CONCLUSIONS

It is becoming increasingly difficult for general surgery programs to attract the best-qualified medical students, and there is cause for concern about the future of this specialty. Students interested in the study of surgical diseases should be encouraged to pursue a surgical education that emphasizes the rewards of surgery derived from patient management, mastery of technical skills, and acquisition of an extensive cognitive background. These meritorious attributes of a general surgery career must be emphasized early in medical school.

The rewards of the surgical profession are considerable, and, more often than not, exceed the more immediate rewards of a CL. However, as with any profession of enduring value, attaining these rewards comes with a high level of commitment to achieve educational and technical proficiency. It is realistic to acknowledge the effort and sacrifices involved. Our students deserve this realism from us.

Students also need our enthusiasm for the aims and ideals of surgery. In showing how *real* and *ideal* are connected in surgical education, we can assist students in overcoming the mentality of the quick fix. The demand for dedicated and skillful surgeons is as acute today as it has been in past generations. Our immediate challenge is to act with foresight and to take appropriate measures to provide encouragement and support for students who will become future residents and surgical practitioners.

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