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An Internet-based survey of factors influencing medical student selection of a general surgery career

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Abstract

Background: This study descriptively analyzes characteristics of general surgery residency and practice and their influence on student interest in surgical careers.

Methods: Fourth-year medical students were invited to complete an Internet-based survey. A 5-point Likert scale described characteristics of general surgery residency and practice influencing medical student specialty selection. The same characteristics of nonsurgical careers were evaluated for students entering other specialties.

Results: A convenience sample of 408 students from 16 medical schools completed the survey. All respondents viewed lifestyles of surgical residents and attending surgeons as negative influences on specialty selection. Workload during surgical residency negatively influenced all respondents' interest in a surgical career. Role model identification and perceived personality fit were important in selection of all specialties.

Conclusions: Medical students who choose surgical careers are not deterred by a negative perception of lifestyle and workload considerations. Mentoring and personality fit are central in medical student specialty selection. © 2005 Excerpta Medica Inc. All rights reserved.

Keywords: Medical student specialty selection; Web-based survey

Specialty selection by senior medical students is a complex, multifactorial process. Role modeling, personality fit, lifestyle considerations, income potential, and debt load are all factors believed to influence medical student specialty choice [1–11]. The current generation of physicians-in-training generally has different values and priorities than their predecessors; members of the so-called Generation X are more likely to question authority, to have less commitment to existing institutions, and to emphasize time off for family and relationships. The importance of personal values and goals extends into the workplace for this group of individuals [12]. In the face of this culture change, general surgery residency may prove less attractive to graduating medical students. The goal of this study is to elucidate the influence of various characteristics of general surgery residency and practice

on medical student interest in surgical careers. The use of an Internet-based survey to evaluate these influences provides a unique approach to this subject.

Materials and Methods

Survey design and administration

Electronic mail contact with graduating medical students at approximately 70 Liaison Committee on Medical Education (LCME)- and American Osteopathic Association-accredited US medical schools was attempted through the administration at these institutions; the institutions were selected because of ready availability of electronic mail contacts in their offices of student affairs. This initial contact included information about the survey and log-in information for the hosting web site. The survey included demographic questions so respondent groups could be compared to one another and to national norms. The survey

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Table 1
Medical schools of responding students

Medical school	Student responses
University of Utah	64
Arizona College of Osteopathic Medicine	49
University of Nebraska	47
Ohio State University	44
Northeastern Ohio University	39
University of Oklahoma	33
University of Chicago- Pritzker	29
Louisiana State University–New Orleans	28
University of South Alabama	19
University of North Dakota	19
University of Arizona	12
University of Hawaii	9
Marshall University	8
Unreported	6
University of Nevada	1
University of Florida	1
Total	408

consisted largely of student-specific questions addressing specialty selection. All respondents answered a basic set of questions about the influence of certain factors when considering general surgery as a career. These questions were also asked of the students entering other specialties when considering their chosen specialty as a career. Students who elected to complete the survey received video rental gift certificates as an incentive. The survey Internet site was available for student response from February 15 until March 20, 2002. The University of Utah Institutional Review Board granted approval for the conduct of this project.

Statistical methods and data analysis

Demographic characteristics and career choice of survey respondents are reported using descriptive statistics. Chi-square tests were used to examine the relationship between gender and specialty selection and urban origin and specialty selection. The relationship between age and specialty selection was analyzed using Student *t* test. The Likert scales used throughout the survey consisted of 5 points, ranging from 1 (extremely negative influence) to 5 (extremely positive influence). A response of 3 was consistent with no influence. Each analyzed Likert scale item was compared to the neutral value of 3 using a 2-tailed 1-sample *t* test; data from respondents indicating a nonsurgical career choice were analyzed separately from those who indicated a surgical career preference. An independent samples *t* test was used to compare Likert scale responses of students pursuing nonsurgical careers to those selecting surgical careers. Finally, Likert scale responses of students selecting nonsurgical careers were compared for impressions of surgical and nonsurgical careers using paired samples *t* tests. All data analysis was conducted using SPSS 10.0.0 (SPSS Inc., Chicago, IL).

Results

Demographics

A total of 408 students from 16 different medical schools responded to the Internet survey. The medical schools of the respondents represent a broad geographic cross-section of the United States (Table 1). The mean age of respondents was 27.2 years, and 52% of respondents were male (Table 2). Self-reported ethnic background of 72% of students who completed the survey was White/Caucasian; the minority groups with the most students responding included Indian or Pakistani (5.4%), other Asian (3.4%) and Southeast Asian (2.7%). The mean age and gender distribution did not differ significantly between survey respondents and US medical students graduating in 2002. Thirty-seven of the students chose general surgery as their specialty (9.1%). Table 3 compares survey respondents' specialty selections with those of all US medical students.

Factors influencing selection of careers in general surgery

The influence of several demographic factors on specialty selection was analyzed. A similar proportion of male and female respondents selected careers in general surgery (10.3% vs 7.9%, $P = .56$). Self-identified geographic background (rural vs. suburban vs. urban) did not differ significantly between students selecting surgical careers and those selecting other specialties ($P = .59$). Finally, the mean age of students selecting careers in general surgery was 28 years, while those selecting nonsurgical careers had a mean age of 27 years ($P = .21$).

Initial analysis delineated the influence of various factors

Table 2
Demographic characteristics of survey respondents versus graduating US medical students

Demographic item	Survey respondents (N = 408)	AAMC reported data
Mean age (\pm SD)*	27.2 y (\pm 3.7 y)	27.7 y
Gender, % (N)†		
Male	52 (214)	55
Female	46 (189)	45
Ethnic background, % (N)		
White/Caucasian	72.1 (294)	65
Indian or Pakistani	5.4 (22)	6.4
Other Asian	3.4 (14)	2.8
Southeast Asian	2.7 (11)	1.5
Black, non-Hispanic	2.2 (9)	7.0
Pacific Islander	1.5 (6)	0.2
Other or unknown	1.5 (6)	0.7
American Indian or Alaska Native	1.2 (5)	0.7
Mexican American or Chicano	0.7 (3)	2.3
Other Hispanic	0.2 (1)	0.7

* $P = .13$.

† Five students declined to indicate gender; $P = .38$.

on medical student selection of general surgery as a specialty. The students selecting general surgery careers and those selecting other careers were analyzed separately. Students entering general surgery viewed workload of attending surgeons as a positive influence on their specialty choice (mean 3.3). Lifestyle and workload of general surgery residents were the two most detrimental influences on the specialty choice of students who entered general surgery (mean of 2.1 and 2.5, respectively). Lifestyle of attending general surgeons and length of training also negatively affected students who chose general surgery residencies (mean of 2.5 and 2.8, respectively). Students who elected residency in other specialties uniformly viewed lifestyle and workload issues, both at the resident and attending surgeon level, to be deterrents to a career in general surgery.

The responses of the students planning a general surgery career with those planning other careers are summarized in Table 4. Although students entering general surgery residencies were negatively influenced by both lifestyle and workload of surgical residents, students who were not entering surgical residencies indicated these were more substantial deterrents (2.1 vs. 1.5 and 2.5 vs. 1.7, respectively; both P values $<.001$). Attending surgeon workload had a slightly positive influence on students who selected a general surgery career but was a negative influence on students who selected other careers (3.3 vs. 2.3, $P <.001$). However, the greatest disparity between students who were interested in general surgery and other students was the self-reported personality fit with the specialty (4.6 vs. 2.6, $P <.001$).

Table 3
Specialty choice of survey respondents versus US medical students

Specialty	Survey respondents, % (N)	AAMC reported data, %
Allergy	0.3 (1)	0.4
Anesthesiology	5.8 (24)	7.0
Dermatology	3.4 (14)	2.5
Emergency Medicine	6.9 (28)	8.1
Family Practice	13.0 (53)	9.1
General Surgery	9.1 (37)	4.7
Internal Medicine	15.0 (61)	5.9
Neurological Surgery	1.0 (4)	1.0
Neurology	1.2 (5)	2.3
Obstetrics and Gynecology	3.9 (16)	4.9
Other Medical Field	3.2 (13)	N/A*
Other Non-medical Field	0.5 (2)	N/A*
Other Surgical Subspecialty	5.6 (23)	0.9
Otolaryngology	1.7 (7)	1.8
Pathology	1.5 (6)	1.5
Pediatrics	12.5 (51)	6.5
Physical Medicine and Rehabilitation	1.0 (4)	1.4
Plastic Surgery	1.2 (5)	1.1
Preventive Medicine	0.7 (3)	0.1
Psychiatry	3.9 (16)	4.6
Radiology	7.1 (29)	6.6
Urology	1.5 (6)	1.6

* A total of 1.8% of AAMC respondents indicated "Other" as their specialty of choice

Table 4

Responses to "When you were considering general surgery, what influence did the following have on you?"

	Surgery respondents, mean \pm SD	Nonsurgery respondents, mean \pm SD	P
Attending lifestyle	2.5 \pm 0.9*	1.9 \pm 0.9*	$<.001$
Resident lifestyle	2.1 \pm 0.8*	1.5 \pm 0.8*	$<.001$
Attending workload	3.3 \pm 2.3*	2.3 \pm 1.0	$<.001$
Resident workload	2.5 \pm 0.9*	1.7 \pm 0.9*	$<.001$
Length of training	2.8 \pm 0.5*	2.3 \pm 0.9*	$<.001$
Family or social demands	3.1 \pm 0.7	2.8 \pm 0.7*	.032
Indebtedness	2.8 \pm 0.6	2.9 \pm 0.5*	.545
Personality fit with the job	4.6 \pm 0.6*	2.6 \pm 1.3*	$<.001$
Identification of a surgical mentor	4.4 \pm 0.7*	3.2 \pm 1.2*	$<.001$

* $P <.05$ versus neutral value of 3.

Medical students intending nonsurgical careers responded to the same set of influencing factors twice, once addressing the impact of these factors when considering a career in general surgery, and again when considering a career in their chosen specialty. All analyzed factors were viewed by these students as having a negative influence on their interest in a general surgical career. All factors differed significantly between the two sets of responses from these medical students (Table 5).

Comments

The use of an Internet-based survey tool to conduct a multi-institutional examination of factors influencing medical student specialty selection is unique to this study. This survey does suffer from possible recall bias and sample bias, as do most surveys of this nature. The timing of the survey was ideal for minimizing recall bias as it was conducted after residency interviews were completed and before National Residency Matching Program (NRMP) results were released. Sample bias is more of a concern since responses came from students at only 16 medical schools, and only 1 of these was a private medical school. Although student affairs administrators were contacted at 70 medical schools, the authors do not have any way to verify that survey information was disseminated to the graduating seniors at all of these institutions. Respondents to the survey also appeared to enter the "core" specialties of family practice, internal medicine, pediatrics, and general surgery at a rate nearly double that reported in American Association of Medical Colleges (AAMC) data. This discrepancy may be a result of survey design, curricular emphases at the medical schools of respondents, or the paucity of responses from students at private medical schools. In spite of this discrepancy in specialty selection, general demographic information of survey respondents was comparable to all medical school graduates in 2002.

Students completing this survey who selected careers in

Table 5
Responses of students entering non-general surgery residency to various factors influencing specialty selection

	When considering a general surgery career	When considering their selected specialty
Attending lifestyle	1.9 ± 0.9*	4.2 ± 0.9*
Resident lifestyle	1.5 ± 0.8*	4.0 ± 0.9*
Attending workload	2.3 ± 1.0*	4.0 ± 1.0*
Resident workload	1.7 ± 0.9*	3.7 ± 0.9*
Length of training	2.3 ± 0.9*	3.6 ± 0.8*
Family or social demands	2.8 ± 0.7*	3.5 ± 0.8*
Indebtedness	2.9 ± 0.5*	3.1 ± 0.7*
Personality fit with the job	2.6 ± 1.3*	4.7 ± 0.5*
Identification of a mentor	3.2 ± 1.2*	4.5 ± 0.7*

All *P* values for paired *t* test are <.05.

* *P* < .05 versus neutral value of 3.

general surgery and those who selected other specialties did not differ significantly in terms of age, gender, or geographic background. Female survey respondents did not differ significantly from their male colleagues in their responses to questions about the influence of lifestyle and workload on specialty selection; this was true for those entering both surgical and nonsurgical specialties (data not shown, available on request). Although demographic variables have been offered as influences on student interest in surgical careers, this was not true for respondents to this survey. More importantly, it indicates that attitudes and perceptions are likely the predominant influence on medical student specialty choice.

The basic design of this survey elucidates the different influences on medical students who decide to pursue residency in general surgery versus other medical students. In addition, it illuminates the different perceptions held by medical students entering nonsurgical residencies about their own specialty versus general surgery. The crucial effect of this design lies in the insight it provides into factors deterring medical students from entering careers in general surgery. The number of applicants for general surgery has steadily declined over the last 20 years, and the NRMP Residency Match in 2001–2002 continued that downward trend. Bland and Isaacs [13] estimate that if this trend were to continue, US medical students would fill only 76.6% of categorical general surgery positions in 2005.

Lifestyle during residency and the grueling nature of surgical residency are touted as critical factors diminishing student interest in surgical careers [14,15]. “Controllable lifestyle” specialties such as anesthesia, dermatology, radiology, emergency medicine, pathology, ophthalmology, and neurology have been increasing in popularity with graduating medical students over the past several years [16–19]. Many theories have been promulgated about the basis for this change in medical student preference, including generational change, family and social factors, increasing numbers of women entering medical school, and length of training. This survey confirms the detrimental impact of the

surgical lifestyle and the workload of surgeons at both the resident and attending levels on student interest in surgical careers. Lifestyle and workload during surgical residency were the 2 evaluated factors with the strongest negative influence on students who chose careers other than general surgery; lifestyle as an attending physician was also a significant concern to these students.

Family and social factors were assessed as a possible influence on pursuit of a general surgery residency. The impact of family and social considerations was a significant deterrent to interest in general surgery for students who entered other residencies. Students who did select a residency in general surgery were not significantly impacted by social and family forces. Moreover, the difference in the impact of family and social concerns were significantly different between students entering surgical residency and those pursuing other specialties. The detrimental effect of family and social influences on selection of a career in general surgery is consistent with the prior findings by Valente et al [20]. This research also demonstrated that time commitment was a concern even to the spouses of those medical students who chose careers in general surgery.

Length of training is another commitment issue that is often discussed as a substantial component of the declining interest in surgical careers. Although the length of surgical training was a deterrent to all responding students when considering a career in general surgery, it was significantly more daunting to the students who chose a nonsurgery residency. Erzurum et al [6] previously showed that students considering careers in surgery were less likely to be dissuaded from surgery on the basis of residency length than their counterparts considering other careers. These findings imply that reducing the time required in training for general surgery or general surgery subspecialties will not substantially alter the pool of medical students interested in surgical careers.

Role models played a large part in the decision-making processes of all students who responded to the survey. Although the presence of a surgical mentor was a positive influence on students who chose not to enter surgical residencies, they responded far more positively to the presence of a mentor in their chosen field. The mean response value to the influence of a mentor within their chosen specialty is not significantly different from the response of those students who chose general surgery to the influence of a surgical mentor. Role models, both positive and negative, have been shown to influence medical student specialty choice [3,4,6,21]. Active and early mentoring has been widely promoted as an important avenue for addressing declining student interest in surgical careers [22,23]. This study reinforces the relevance of role modeling in encouraging medical students to consider surgical careers.

Personality fit provides a critical element in understanding student choice of specialty. Students who did not pursue a surgical residency were influenced away from surgical careers by their perceived lack of personality fit with general surgery; these same students were strongly drawn to

ward their chosen specialty by perceived personality fit. Personality fit clearly provides an impetus toward or away from certain specialties for medical students [7]. Unfortunately, the specific facets of medical student self-perceptions of personality fit prove exceedingly difficult to elicit due to their intangible nature. The idea of personality fit with a specialty's practitioners is likely to complicate any efforts to describe the algorithms behind medical students' specialty choices. Perhaps the best means of redress for personality fit lies in demonstrating that not all surgeons are derived from the same "surgical personality" prototype; while certain traits behoove any good surgeon, the breadth of surgical practices demands a variety of personalities to meet patients' needs.

The results of this survey demonstrate that lifestyle and workload are both detrimental aspects of the surgical profession when medical students are selecting a specialty. The impact of the 80-hour work week on student interest in surgical specialties remains to be seen, although medical students should readily recognize that the improved lifestyle implicit in this reform does not necessarily extend to practice by attending surgeons. For those students who elected to pursue training in general surgery, the positive impact of a surgical mentor and a perceived personality fit with the specialty managed to counteract their concerns about lifestyle and workload. Redress of lifestyle and workload issues within surgery may improve the palatability of surgical specialties for medical students, although it is likely that addressing these issues alone will be insufficient. Efforts to mentor premedical and medical students must be ongoing. An important complement to mentoring lies in demonstrating the true diversity of general surgery practice and the need for many types of individuals to fill these assorted niches.

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