Choosing General Surgery

Insights Into Career Choices of Current Medical Students

Dmitri V. Gelfand, MD; Yale D. Podnos, MD, MPH; Samuel E. Wilson, MD; Jonathon Cooke; Russell A. Williams, MD

Hypothesis: The number of unfilled general surgery programs in the United States increased from 4 in 1999 to 41 in 2001. This study seeks to determine if changes in student attitudes occurring during their medical school careers and during the third-year general surgery clerkship contribute to a decline in interest in a surgical career.

Design: Prospective survey of medical students at a public medical school in California.

Participants and Methods: Each medical student received a survey via the Internet. Responses were anonymous. Once quantified, χ² analysis was used for comparison and analysis of survey results. Comparisons were made between individual class years and on the basis of whether the respondent completed the third-year general surgery clerkship.

Results: Of 368 surveys sent, 232 (63%) were successfully completed and included in the study. Comparison of students’ attitudes before and after completion of their general surgery clerkship showed that following surgical course exposure more students believed surgery lacked breadth of expertise, limitations over stress, control over one’s time, regularity of schedule, adequacy of leisure time, and income commensurate to workload (P < .05). These results are also consistent in comparisons between individual class years.

Conclusions: Data suggest that medical students seem to be more concerned with issues of “controllable lifestyle” such as adequacy of family and/or leisure time, high level of stress, and amount of work and commitment. The erosion of income differential between demanding and less taxing specialties was also an important cause cited for the flagging interest in surgical disciplines.

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According to the Association of American Medical Colleges National Resident Matching Program Database, the number of unfilled general surgery programs in the United States has grown from 5 in 1997 to 41 in 2001. This is an unexpected turn of events for a specialty that historically has been one of the most prestigious, competitive, and resilient to factors that would limit applications from the upper tier of medical students.

Previously published data suggest that an early exposure to positive role models, as well as career and research opportunities, is integral in attracting and maintaining medical students’ interest in general surgery. In addition, it has been suggested that “controllable lifestyle” is becoming an essential factor in career selection for medical students, and specialties that can provide it, such as emergency medicine, dermatology, and, recently, anesthesiology, are now attracting increasing numbers of better students. Lack of surgical role models and the perception of a less controllable lifestyle could have a negative effect on recruitment of the best students to general surgery residencies.

This study seeks to determine which factors dissuade medical students from choosing a career in general surgery. In particular, emphasis is placed on elucidating any changes in medical student perception occurring during and after the third-year general surgery clerkship with the hope of identifying factors that can be changed during medical student surgery rotations.

RESULTS

Of 368 surveys, 232 (63%) were successfully completed and included in our study. Noncompliance, that is, students refusing to fill out the questionnaire, was the main obstacle in attaining the higher re-
PARTICIPANTS AND METHODS

During the 2000-2001 academic year, all 368 medical students at the University of California Irvine College of Medicine, Orange, received an Internet-based survey consisting of 32 true-false statements designed to identify factors in general surgery education, training, and career that affected decisions to not pursue general surgery as a career choice. A set of open-ended questions designed with the same purpose were also given. Demographic data such as the amount of student debt, marital status, age, sex, race, and prior profession were also surveyed. Students’ responses were divided into 4 separate groups according to the student’s year in the medical school.

For analysis, the students were divided into 2 groups according to whether they had taken the third-year general surgery clerkship. The groups were compared using χ² analysis to determine statistical significance.

We studied potential causes for declining match results of the general surgery residencies for the last 2 years. Changing values and professional goals in medical school graduates and the ongoing emphasis on primary care fields at the expense of specialty areas were theorized as possible causes. These trends started in the late 1980s and followed the Council on Graduate Medical Education’s third report in 1992 and eighth report in 1996. In these reports the premise of an oversupply of specialist physicians in the United States and a concurrent dearth of generalist physicians was used to argue for increasing the number of primary care physicians to better serve the population’s medical needs. For example, it was thought that to slow down the rapidly raising costs of health care and correct the geographic maldistribution of physicians, the specialist-generalist ratio would need to be altered to 50:50. Not surprisingly, the promise of such advantages prompted an array of legislative, financial, and institutional attempts by state and educational organizations throughout the country to try to increase the number of primary care physicians. This new attitude resulted in preferential bias to medical school applicants with special interest in primary care and to increased time spent in ambulatory settings while in medical school.

Furthermore, University of California’s 1994 “Memorandum of Understanding” and 1997 Budget Reconciliation Agreement were introduced to attract medical students into primary care fields. These measures had no significant effect on the numbers of students entering general surgery residency. The high number of general surgery positions unfilled in 2001 suggests a new trend is becoming apparent.

In our study we sought to address these issues by surveying the opinions and perceptions of first-, second-, third-, and fourth-year medical students. The students were divided into 4 groups according to the year at school and, later, separated into 2 groups based on completion of the surgical core rotation. The study was designed to determine how medical students’ perceptions change during their ascension through the medical school years and, in particular, after the surgery rotation.

The true-false statements devised for the survey represented attempts to describe the general surgery residency consistent with our null hypothesis. Data were plotted graphically and showed the dynamics of students’ attitude toward and perception of general surgical residency. We found that more students each year feel the promise of an oversupply of specialist physicians in the United States and a concurrent dearth of generalist physicians was used to argue for increasing the number of primary care physicians to better serve the population’s medical needs. For example, it was thought that to slow down the rapidly raising costs of health care and correct the geographic maldistribution of physicians, the specialist-generalist ratio would need to be altered to 50:50. Not surprisingly, the promise of such advantages prompted an array of legislative, financial, and institutional attempts by state and educational organizations throughout the country to try to increase the number of primary care physicians. This new attitude resulted in preferential bias to medical school applicants with special interest in primary care and to increased time spent in ambulatory settings while in medical school.

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The true-false statements devised for the survey represented attempts to describe the general surgery residency consistent with our null hypothesis. Data were plotted graphically and showed the dynamics of students’ attitude toward and perception of general surgical residency. We found that more students each year feel the volume of leisure and personal time to be inadequate in general surgery careers. Prior studies have noted that lifestyle, and especially a “controllable lifestyle,” is a major contributing factor in specialty choice by students. Our data support this statement, showing that 92% of fourth-year students feel that general surgeons have inadequate control over their time—a significant increase from 67% of the first-year students agreeing with the statement. In addition, it seems as if students become more
aware of the material aspects of working in medicine and are concerned with finances. There is a major increase in the number of students who believe that a surgeon’s income is inadequate for the amount of work and level of commitment required: from 26% of first-year students to 60% for the fourth-year students. Students are concerned about the erosion of income differential between surgery and less stern disciplines, reiterating the

### Student Responses to Survey Statements

<table>
<thead>
<tr>
<th>Survey Statement</th>
<th>Year in Medical School, % of Students Agreeing</th>
<th>(X^2) Analysis</th>
<th>(P) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lacking continuity of care</td>
<td>63 67 59 50</td>
<td>2.28</td>
<td>.13</td>
</tr>
<tr>
<td>Not enough focus on disease prevention</td>
<td>73 68 78 65</td>
<td>0.05</td>
<td>.82</td>
</tr>
<tr>
<td>Area of expertise is too narrow</td>
<td>32 24 26 5</td>
<td>4.15</td>
<td>.04</td>
</tr>
<tr>
<td>Manual dexterity is overemphasized</td>
<td>27 21 21 23</td>
<td>1.28</td>
<td>.26</td>
</tr>
<tr>
<td>Differential diagnosis skills understated</td>
<td>35 27 16 13</td>
<td>7.51</td>
<td>.006</td>
</tr>
<tr>
<td>Not enough emphasis on people skills</td>
<td>63 54 61 68</td>
<td>0.91</td>
<td>.34</td>
</tr>
<tr>
<td>Boring</td>
<td>12 12 2 7</td>
<td>3.30</td>
<td>.07</td>
</tr>
<tr>
<td>High pressure/stress</td>
<td>87 87 88 89</td>
<td>12.05</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Overbearing responsibility</td>
<td>64 64 47 60</td>
<td>2.53</td>
<td>.11</td>
</tr>
<tr>
<td>No control over one’s time</td>
<td>67 72 88 92</td>
<td>12.05</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Irregular schedule</td>
<td>78 81 90 86</td>
<td>3.07</td>
<td>.08</td>
</tr>
<tr>
<td>Inadequate family time</td>
<td>79 82 100 92</td>
<td>10.38</td>
<td>.001</td>
</tr>
<tr>
<td>Insufficient leisure time</td>
<td>71 78 95 89</td>
<td>10.44</td>
<td>.001</td>
</tr>
<tr>
<td>Too much work</td>
<td>63 73 69 76</td>
<td>0.41</td>
<td>.52</td>
</tr>
<tr>
<td>Too big of a commitment</td>
<td>57 64 66 68</td>
<td>0.90</td>
<td>.34</td>
</tr>
<tr>
<td>Income is not adequate for the level of commitment and workload</td>
<td>26 36 50 60</td>
<td>12.02</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Job security is not encouraging</td>
<td>13 24 26 28</td>
<td>2.17</td>
<td>.14</td>
</tr>
<tr>
<td>High malpractice</td>
<td>72 59 61 50</td>
<td>1.53</td>
<td>.22</td>
</tr>
<tr>
<td>A lifetime of scut work</td>
<td>50 27 26 15</td>
<td>1.60</td>
<td>.21</td>
</tr>
<tr>
<td>Old boys’ club</td>
<td>56 63 52 57</td>
<td>0.51</td>
<td>.47</td>
</tr>
<tr>
<td>Training is too long</td>
<td>69 69 64 52</td>
<td>4.06</td>
<td>.44</td>
</tr>
<tr>
<td>High risk of exposure to AIDS</td>
<td>31 37 28 36</td>
<td>1.31</td>
<td>.72</td>
</tr>
<tr>
<td>Not sufficient sense of accomplishment</td>
<td>10 15 2 7</td>
<td>3.76</td>
<td>.05</td>
</tr>
<tr>
<td>Too conservative/not open to innovative thinking</td>
<td>20 22 19 10</td>
<td>1.93</td>
<td>.16</td>
</tr>
<tr>
<td>Intellectual growth is limited</td>
<td>23 20 11 13</td>
<td>6.82</td>
<td>.009</td>
</tr>
<tr>
<td>High urgency of presenting problems</td>
<td>67 55 64 68</td>
<td>0.58</td>
<td>.45</td>
</tr>
<tr>
<td>Immediate impact of intervention</td>
<td>76 74 90 89</td>
<td>7.00</td>
<td>.009</td>
</tr>
<tr>
<td>Limited interaction with other physicians</td>
<td>30 16 11 7</td>
<td>5.89</td>
<td>.02</td>
</tr>
<tr>
<td>Low status among other specialties</td>
<td>10 10 4 0</td>
<td>44.60</td>
<td>2.42E-11</td>
</tr>
<tr>
<td>Low prestige among general public</td>
<td>9 7 2 0</td>
<td>49.64</td>
<td>1.84E-12</td>
</tr>
<tr>
<td>Restricted autonomy/independence</td>
<td>34 30 38 13</td>
<td>0.89</td>
<td>.34</td>
</tr>
<tr>
<td>Limited patient-physician interaction</td>
<td>72 56 59 55</td>
<td>1.08</td>
<td>.30</td>
</tr>
</tbody>
</table>

*Of the 368 surveys distributed via the Internet to 368 medical students at the University of California, Irvine College of Medicine, Orange, during the academic year 2000-2001, 232 (63%) were successfully completed and included in this study. The response rates of the first- and second-year students were 79% (73 students) and 85% (79 students), respectively, while the third- and fourth-year students’ response rates were 46% (42 students) and 41% (38 students), respectively. The male-female ratio was 125:107. AIDS indicates acquired immunodeficiency syndrome; E, estimated.
importance of the issue of lifestyle in the absence of monetary reward. Other areas that represent an increased concern for medical students as their years in school progress are irregularity of schedule, quantity and intensity of work, and commitment, which have always been an integral part of general surgery training.

We also examined the areas that failed to show significant change in student responses through the years. Presence of high stress level in general surgery residency was a consistent and prominent finding with 88% of students agreeing with the statement through all 4 years. It also seems as if a constant number of student’s feel that surgery remains an “old boys’ club” (57%) with residual lack of accommodation to women. The focus on disease prevention is yet to be sufficient (61.5%) in the minds of our students.

It is encouraging to see that some areas improve as the student’s time at medical school progresses. While still high, fewer numbers of medical students each year believe general surgery has limited continuity of care (67%-50%), excessive training (69%-52%), and limited patient-physician interaction (72%-55%). The number of students who think that surgical training understates differential diagnostic skills, is too conservative, and means a “life-time of scut work” is diminishing as well. With each year, a higher number of students report that surgery is a highly respected and prestigious profession with extensive avenues available for intellectual growth, almost nonexistent boredom, and a strong sense of accomplishment.

How can the experience in medical school and residency be changed to address these concerns? While it is not within the realm of individual academic surgeons to change financial reparations, as an entire profession, we must continue to place pressure on health care payers (government and private) to justly compensate surgeons for their work effort in care and commitment to patients. However, if we continue to see our ranks diminish over time, the effect of supply and demand would dictate higher payments to surgeons as the supply of surgeons decreases. An example of this is the current necessity for the hospitals to make “on-call” payments to scarce specialists such as orthopedic surgeons, pediatric surgeons, and neurosurgeons.8

Many of the lifestyle concerns voiced by the medical school students reflect how they see surgical residents working rather than what life is really like as a practicing surgeon. Because of increased complexity and required level of care presently seen in most inpatient settings, it is difficult to structure a residency with significantly less demanding workloads and accomplish sufficient clinical experience. Indeed, some attempts have been made to transform surgical residency into a less onerous and grueling training, as perceived by some, as a part of an ongoing attempt to enforce the 405.4 Regulations of New York State Department of Health, Medical Staff in New York Codes, Rules and Regulations, better know as Bell regulations.9 The original regulations, however, underwent modifications to account for surgery residency specifics and a surgical waiver was developed. The concept of “generally resting” was introduced with assumption that surgical residents will be able to sleep during the on-call hours. Thus, the on-call hours would not be counted in the time limits of the original regulations. The definition of generally resting was left at the discretion of the hospital.10 Originally introduced in December 1986 following the Libby Zion case, the Bell regulations were signed into a law as a part of the Health Care Reform Act 2000 State of New York.11,12 From their creation, these regulations faced stringer opposition from both hospital administration and the medical community. Surgeons were particularly vociferous. The most notable were the concerns of compromised continuity of patient care and increasing costs to the hospital. In a recently published article, the executive director of the American College of Surgeons expressed concern regarding the readiness of future residents to face the realities of surgical practice as a result of constrained work hours.13 At present, the Bell regulations remain mostly limited to New York State. However, the debate over residents’ lifestyle remains. In 2000 the American Medical Association’s House of Delegates passed a resolution urging other states to apply the New York State experience as a model for the state regulations for resident work hours and work-related conditions.19 Last year a petition was filed with the Occupational Safety and Health Administration by a group of advocacy organizations and private citizens requesting an establishment of federal guidelines for resident’s work hours similar to those of New York State. This movement toward limited hours will likely continue.

Published data suggest that an early exposure to positive role models is critical in attracting and maintaining medical students’ interest in general surgery.15 Our study shows that exposure to role models in the University of California Irvine Medical Center was adequate, with 36% of first-year, 31% of second-year, 50% of third-year, and 52% of fourth-year students agreeing with the statement. For the last 3 consecutive years the Department of General Surgery at the University of California Irvine Medical Center was the winner of the Excellence in Teaching Award given by students in recognition of outstanding teaching by a department, and the Golden Apple Award to outstanding faculty members for teaching at all levels: clinical, scientific, and academic. In recent years, the members of faculty of the Department of Surgery were awarded the American Medical Women’s Association Gender Equity Award and Associated Medical Students Excellence in Teaching Award.16 Yet despite this, fewer of our students are entering general surgery.

**CONCLUSIONS**

This survey points out a change in medical students’ sets of values and attitudes toward general surgery as a future profession. Medical students seem to be more concerned with issues of controllable lifestyle such as adequacy of family and leisure time, level of stress, and amount of work and commitment. An issue of material rewards becomes especially prominent as the time to choose future residency approaches and debt from student loans increases. Students need to be exposed to the humanistic values of surgery during medical school as early as possible but need to be reassured that their sacrifices and commitments will be compensated. Early in-
volvement of students in mentored externship and exposure to positive role models is essential. Concurrently, it is imperative to create a more realistic and livable life environment experience for medical school graduates in surgical residency.

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REFERENCES


DISCUSSION

Darryl T. Hiyama, MD, Los Angeles, Calif: This study is representative of the widespread response among general surgery training programs to the apparent declining interest of graduating medical students to choose the field of general surgery as a career. We are all acutely aware of the results of the 2001 National Resident Matching Program in which a record number of categorical general surgery training positions (41) went unfilled. Since the spring of 2001, at every national meeting, the same questions arise: why is general surgery no longer attractive as a career and what can we, as a group, do to once again attract the best and brightest to our field.

This study is intended to address the first question. By survey, the sentiments and perceptions of medical students at a single institution in a single academic year were assessed. The survey questions were primarily posed in a negative connotation, and addressed aspects of general surgery training, the specialty itself, as well as the lifestyle of both residents and attendings. In essence, a snapshot of what might be the turning points of general surgery to the current generation of medical students. Two thirds of the medical students responded to the survey, though more than half of the senior and junior students apparently did not. A focus of the analysis was the trend in medical student responses as one ascended through each year of medical school and whether the student had completed the third-year surgery clerkship. Using this trend analysis, the authors indicate that after exposure to the third-year clerkship, more students felt that the amount of leisure and personal time during training is inadequate, and that general surgeons do not have control over their time. In addition, students, who do seem to be increasingly savvy in regards to the financial and material aspects of medicine, perceived that the increased remuneration for general surgeons is not commensurate with the work and level of commitment. Further, after the clerkship experience, medical students also perceived that the area of expertise was not too narrow, nor diagnostic skills under emphasized, and that there was adequate room for both intellectual growth and interaction with other physicians. The authors conclude that the medical students appear to be more concerned with issues of a controllable lifestyle and appropriate income given the nature of the work involved.

These conclusions do seem to be consistent with other studies that have demonstrated that the medical student of today is sophisticated, informed, and has significant demands in terms of lifestyle and goals than students from prior decades. In this study, despite being exposed to a very popular and acclaimed clinical rotation, medical students in the authors’ institution find the lifestyle aspects of the specialty unattractive.

Despite my own personal agreement with the impressions put forth by the authors, I have a number of questions regarding the study that I wish to pose. In regards to the subjects of your study, at what time of the academic year was the survey administered in relationships to the third-year clerkship and the “match.” In other words, how many of the junior students had completed the clerkship at that time, and how many of the fourth-year students had already made their choices for residency programs. My second question is how many senior students, in the year that the survey was given, opted for applying for general surgery positions. In my own institution, the number of its students interested in general surgery rises and falls on a year-to-year basis. Finally, as you already address, do you feel that medical students are obtaining an accurate perspective of the lifestyle of practicing attending general surgeons, as opposed to residents, during their clerkship experience, and might addressing this issue perhaps make a difference in their eventual career choices.

I commend the authors for their work and encourage them to continue their efforts in a longitudinal fashion. I also wish to commend the Program Committee of the Association for including this paper in this year’s program. The membership of this organization collectively bears great influence on the specialty of general surgery, and as individuals, many members serve as excellent role models, mentors, and advisors to scores of medical students each year. It is for us to ensure that we continue to recruit the brightest and best to our field.

William Schecter, MD, San Francisco, Calif: I enjoyed this paper very much. I rise to suggest that the problem is in fact us. I suspect if you administered this survey to members of the American College of Surgeons, the results for some of the questions might not be very different. Our concern for de-
creasing remuneration and our chronic depression are passed to our students. I disagree with the authors’ conclusion that the students need more exposure in the third year. We need to go back to the first year. My colleague, Andre Campbell, MD, and I have just instituted a surgery club, an honors program that is longitudinal. It starts in the first year. We had our first meeting a month ago. Forty students came out and are developing personal relationships with attending surgeons from the very beginning. At least at the University of California, San Francisco, the students are actively discouraged in the first 2 years from pursuing a career in surgery by their teachers. By the time we get to them, the game is over. So we need to start this in the first year, not the third year.

Earl S. Schuman, MD, Portland, Ore: I enjoyed this paper immensely and it confirms my faith in the younger generation that they have some good sense in selecting fields. I was wondering though in looking at how they have to make their decisions in quality-of-life issues, do you know how many of the students have spouses or significant others and did you interview them or do you plan to?

Julie Freischlag, MD, Los Angeles: Since half or more of medical students are female, there certainly is an issue of sex and I guess I am the one that is best to bring that up today. Did you look at the students, the difference between the gender responses? Part of it I think is that if you do not look like them you may not want to be them. If we look around the room, there is a lack of women in our field. How are we going to attract half of the good medical students if they are all women? So were there any differences between men and women in your survey?

John Vetto, MD, Portland: I want to emphasize a point that Dr Schecter made. At the Oregon Health and Sciences University, surgeons teach the first year anatomy course; so that we are the first specialists the medical students meet. In the second year we are major participants in the 1-to-1 student preceptorship. Thus, when the students come into the third year, they know us fairly well. It is very important. Conversely, it is very hard to try to get students to meet us for the first time during an increasingly shrinking third-year rotation.

James E. Goodnight, Jr, MD, PhD, Sacramento, Calif: My point is the same as made by Dr Freischlag. In a survey performed at our institution by Kathrin Mayer, MD, and Hung Ho, MD, about 3 years ago (which might make it out-of-date), they found that the reasons that medical students chose general surgery were generally very idealistic and very worthwhile. There was absolutely no gender difference in the reasons they chose it. But I would agree with Dr Freischlag, as you look at these data, you do have to see if there are gender differences. I would bet they are not, but that has to be part of the data.

Arthur Stanton, MD, Oakland, Calif: I do not like to take an unpopular point of view but when I went into practice some 35 to 40 years ago, my community that has since increased in size had 67 surgeons. There are now 12. If there were 67, 50 of them would not be making a living. Is it not possible that we have been dealing with an over bloated supply of surgeons in the past and that maybe it is seeking its proper level at this time?

William Plested, MD, Santa Monica, Calif: This is certainly a very complex and multifaceted problem. There is no question that a lot of things influence it. We have the normal variations in physician distribution that are always present. As you will remember, 5 or 6 years ago you could not find a job for an anesthesiologist. Today, they are very much in demand. Some of that is at work here, however, there are other problems such as a new and very powerful emphasis among young physicians on lifestyle. I would refer those of you who are interested, to the work of Marilyn Moats Kennedy who has done extensive demographic research about what drives different generations. There is a tremendous generational difference with which we have not really come to grips.

One of my favorite quotes comes from an old comic strip called “Pogo.” Pogo once said, “We have met the enemy, and he are us!” We must always ask ourselves if this applies. We heard the other day, Tom Berne saying that the PCSA and the college alter years and years, are not yet ready to address the 80-hour work week for our residents—an 80-hour work week! When I deal with students and residents, as we do constantly at the American Medical Association, they come to us to solve the problems for which they get no satisfaction at their parent institutions. They tell us that “surgeons” are the bad guys who are locked in the past and are unwilling to recognize the needs of today’s young physicians. This message is instilled into students and residents from the day they set foot in medical school. Surgeons are too often seen as the people who do not listen to their needs and their demands. So I would certainly like to ask the authors, one of whom is at the front table, “What has happened at your institution, and what you have done to make sure that you are not seen as the enemy but part of the solution to your residents’ problems?”

Bruce Stabile, MD, Torrance, Calif: I really do not believe that we can over emphasize the issue of role modeling. I am aware of at least one study that has looked at this in great depth in the state of Ohio. Role modeling was the single most discriminating factor in the choice of students’ career planning. If you do not have good role modeling, then there is virtually no chance that you will choose a career in surgery. I agree with some of the other individuals who have commented that it needs to start from day 1 because the medical school admissions committees are essentially discriminating against people who tend to gravitate to surgery. So we are starting out below ground zero when the students enter the medical school hallway.

The other issue that was alluded to by Dr Freischlag is the gender issue. This is obviously a very sensitive one. Let me give you a little information that was recently presented to the Association of American Medical Colleges by a group from Jefferson Medical College, Philadelphia, Pa, who studied 4767 graduates of their medical school. This was a retrospective study and it has all of the problems associated with that. Nevertheless, compared with males who had a 20% interest in surgery at the time they entered medical school, females had only a 6% interest. As Dr Freischlag has pointed out, when you look around and if you do not see folks like yourself, you are much less likely to become interested. The other sobering finding was that during the course of medical school, three quarters of those 6% of females who were originally interested in surgery became disinterested in surgery. So we lost 3 of 4 potential candidates who were women. Although there was a drop off among the men as well, it was not nearly so dramatic. So I think we really do have to bring this gender issue to the fore.

Thomas Russell, MD, Chicago, Ill: This is a really timely discussion and I can tell you that these kinds of discussions are happening all around the country at groups such as this. It is very healthy that we are looking at lifestyle and hours, things that we would never really grapple with in the past because it was upsetting to the system. There is one other issue that I would like to make a comment on and that deals with the workforce issues, which is something that was really not discussed. Recently in the February issue of Health Affairs there is a former dean of the University of Wisconsin who has modeled the need for surgical specialists in this country. His conclusion in this article in Health Affairs is that there will be a huge demand for surgical specialists in this country. Now that is a debatable position. There are other people who have said it is the other way. But he feels there will be a great shortage in surgical specialists in the future because of the aging population and the increasing number of people in our country. My question to the au-
thors is, did the opportunity for workforce issues surface as a reason for people not choosing surgery as a career?

Dr Williams: Thank you for the opportunity to respond to the many discussants and particularly I thank Dr Hiyama for his discussion and injection of wisdom into the paper.

Why the change? Is it simply generation X and Y getting their revenge on the baby boomers who spoiled the practice of surgery for them as the baby boomers roll on toward Medicare and their increased need for surgical treatment? The generation differences in selecting a specialty and what can be expected from such a career in terms of reward for work effort is a major part of the explanation. For this generation of medical students the work in surgery and disruption in life are simply not rewarded. Other specialties such as dermatology, ophthalmology, rehabilitation medicine, and anesthesia are far less onerous in terms of life style and much more rewarding.

If you consider the government and private health insurance administrations, the changes that have been made, by them in reduction of payments are simply business based. Practicing surgeons have also made such a business decision. They have decided that it is not worth the time and effort to cover the emergency department anymore and be available to treat such conditions as appendicitis. The newspapers currently abound with articles on this issue of uncovered emergency surgery. I do not think we can blame surgeons for reconsidering whether to make themselves available to treat such emergencies, where for appendicitis the payment is $200. The commitment of time and effort, in addition to disruption of life and interference with elective work are simply not worth it. And at the other end of the surgery hierarchy, the students have done a similar calculation, resulting in a reduction in surgery trainees.

What are going to be the effects of all of this? It is likely that more than 41 programs in the 2002 match will remain unfilled and you will see programs competing with each other for residents. You are probably already well aware of some programs that advertise a 1 in 9 on-call for interns vs the still extant 1 in 2 that is banned by the residency review committee.

I do not think that the chairman’s penthouse is under threat or the residents’ union negotiating for fresh flowers in the call room every day, but programs are offering many benefits, for example, in New York they offer resident accommodation. I do not think we have reached the point as anesthesia did a few years ago where programs need to pay the airfare of an applicant for an interview and cover the cost of accommodation at the top hotel near their medical center. But things are heading in that direction.

The work will still need to be done, patients will be sicker and require a higher acuity of care and what is being done by surgery residents will need to be taken on by other health care paraprofessionals. I think there will be a large growth in physician extenders.

Programs will cease to provide residents for many of the subspecialties that are not strictly in general surgery. Many of the specialties where the operations do not count toward the critical numbers required to sit for the board. I can imagine the transplant surgery or cardiac surgery would fall into that category. So we need to be training people to do the work there.

Fewer people will take fellowships. A good example is vascular surgery where the numbers applying roughly equal the number of positions, so that there is no choice of the best and brightest anymore going on to fellowships.

Almost all programs will probably have to cut their numbers. If you look at anesthesia, the numbers were cut when the applicant numbers decreased, and the residency directors have largely been unsuccessful in restoring those numbers. Once the resident numbers are reduced, it is exceedingly difficult to get the residents back. Surgery training programs across the country, at this time, are staffed with less than the full compliment of residents, because of resignations to change specialties. Residents who want to change programs or return to surgery training, having previously been dropped often for a poor performance are a valuable commodity. They can negotiate really for any program they want because there are residents missing at all levels in programs across the country.

Dr Russell, director of the American College of Surgeons, pointed out in his editorial in the Bulletin of the American College of Surgeons, some months ago that 25% of the residents in surgery training programs resign and go into other specialties as a result of their first hand experience with the work, and that about half of the trainees in cardiac surgery programs are foreign medical graduates.

I think this equation can be really upset if programs decide to take residents from the eternal sources of medical graduates in China, Russia, and South Asia, and Arab countries. I would discourage programs from making up their numbers by doing that.

The reduced numbers of applicants for surgery training is not the death knell for our beloved specialty. People who go into surgery these days go into it for just the right reasons. They are driven by a true calling, and see the enjoyment derived from the work and have a full appreciation of the misery factor that is so well known. I make the following analogy, when people come for interviews, somewhat cynically but I think there is an element of truth to it: It is like being called into the priesthood or the nunnery. You have to forego some of the things that you might otherwise enjoy in life, but you will get a great deal of enjoyment out of the job that you have actually chosen.

In the year that this study was done 3% of the class opted for a career in surgery; this was a fall off in numbers. Our school actively encourages primary care. Prior to that we had about a 6% rate among the students going into general surgery. We surveyed the California medical schools several years ago and found 6% of students from the graduating classes were going into general surgery at that time, and this information was collected at the time anesthesia was having its resident applicant crisis. This information was presented to the members of this society and published in the Archives of Surgery.

Surgery leaders have alluded to the fact that surgeons must make more of an effort to become role models. I would point out that the student surgery clerkship for the students at our institute is universally rated, by the students, the top in the school. Surgeons win literally all of the teaching prizes for the faculty and the residents in the surgery program literally win every resident teaching prize. I think that is an indicator the students enjoy working with the surgeons, who by assumption are good role models and the students certainly enjoy the teaching environment. But familiarity with the surgeons and their work confirms for the students, they want none of this for themselves as a career.

We have conducted a surgery interest group for years. The meetings attract large numbers of first- and second-year students but by the time it comes to match list time, when reality sets in, there are very few students, still 3% to 6% of the class interested in a career in surgery.

It has been suggested that teaching by surgeons to the first- and second-year of the medical school class would attract more students into surgery. I think this is useful in that it makes the students aware of whom the surgeons are and shows them to be not an elitist group in the medical school. I doubt that interacting with surgeons in the anatomy room or during lectures makes any significant difference to the students in selecting a career in surgery. Medical students are far more shrewd. They do their career cost-benefit analysis and surgery is the loser.