

Specific Interventions to Increase Women's Interest in Surgery

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At a time when women represent half of medical students nationwide, substantial gender discrepancies still exist in the field of medicine. Although many women elect to enter the fields of pediatrics, obstetrics and gynecology, family practice, internal medicine, and psychiatry, fewer choose careers in surgery.¹ The most recent data about gender and specialty practice are from 2006, at which time only 15% of general surgery attending physicians and 28% of general surgery residents were women.^{1,2} These numbers are the lowest among all major specialties. Surgical specialty residency programs, including urology, neurosurgery, and orthopaedic surgery, have even fewer female residents.²

Multiple barriers have been identified that can hinder women's interest in and selection of surgery as a profession. Most often cited are lifestyle concerns, but recent evidence shows that both men and women are increasingly choosing specialties with controllable lifestyles. Controllable lifestyle specialties include anesthesiology, dermatology, emergency medicine, neurology, ophthalmology, otolaryngology, pathology, psychiatry, and radiology, as defined by the physician's control of time spent on professional responsibilities.³ From 1996 to 2003, the percentage of women and men choosing controllable lifestyle specialties increased from 18% to 36% and from 28% to 45%, respectively.⁴ In fact, a study of specialty choices from 1990 to 2003 showed that in every year, men were actually more likely than women to choose a controllable lifestyle specialty.⁵

Although lifestyle is clearly a factor in specialty selection for both men and women, additional factors must explain the ongoing gender imbalance in the field of surgery. Research has identified a number of deterrents to a career in surgery for women, including a lack of female role models, sexual discrimination, the perception of surgery as "an old boy's club," and pregnancy and child care concerns.⁶⁻¹⁰ Although there is extensive literature exploring the barriers to a career in surgery for women, we set out to directly

assess whether specific interventions targeting these barriers would increase women's interest in surgery.

In order for general surgery and surgical subspecialties to attract the most talented and capable medical students, these fields must appeal to an increasingly diverse medical student body and specifically to women. With this study, we set out to evaluate whether targeted, practical interventions could promote and encourage women's interest in surgery.

METHODS

A survey was created with the aim of evaluating specific target interventions that might increase women medical students' interest in surgery. The survey was designed using an online survey tool. The survey consisted of 31 questions, including 7 demographic questions. Most questions used a 7-point Likert scale (1 = strongly disagree, 4 = neutral, 7 = strongly agree). Several questions used a simple yes or no format. The Vanderbilt University Institutional Review Board approved this study. Please see Appendix (online only) to view the survey in its entirety.

The survey was initially sent to 25 US medical schools selected randomly from the Association of American Medical Colleges' list of member medical schools. A request for participation was sent electronically to the Dean of Student Affairs or an equivalent administrator at each school. Administrators willing to participate completed a signed letter of consent and distributed the survey to their student body by email. Students were provided with an Internet link to the survey and were instructed that survey participation was completely voluntary and that data would be collected anonymously using the online survey tool.

Of 25 schools initially selected through randomization, 5 agreed to participate. From these 5 schools, a total of 381 responses were obtained. To survey a larger subject population, 20 additional schools were randomly selected and contacted, of which 5 agreed to participate. From these additional 5 schools, 638 responses were collected, for a total of 1,019 responses. Data were collected from December 2007 through March 2008.

To analyze the data, the 7-point Likert scale results were collapsed into 3 categories: "Disagree" (Likert 1 to 3), "Neutral" (Likert 4), and "Agree" (Likert 5 to 7). Pearson's

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Table 1. Participating Medical Schools

Georgetown University School of Medicine
Mount Sinai School of Medicine of New York University
Sanford School of Medicine of the University of South Dakota
Southern Illinois University School of Medicine
University of Kansas School of Medicine
University of Miami Leonard M. Miller School of Medicine
University of Minnesota Medical School
University of Missouri-Columbia School of Medicine
University of Texas Medical Branch at Galveston
Vanderbilt University School of Medicine

chi-square test was then performed to test for statistical significance. Data were also collapsed in an alternative fashion of Disagree (Likert 1 to 2), Neutral (Likert 3 to 5), and Agree (Likert 6 to 7) for comparative analysis, yielding the same results.

RESULTS

A total of 1,019 survey responses were collected from 10 medical schools. Overall survey response rate was approximately 22% ($n = 1,019/4,635$). This was determined using information provided by the Dean of Student Affairs about the total number of students to whom the survey was distributed. A total of 986 of the 1,019 students (96.8%) finished the survey, although subjects were allowed to opt out of any question at their discretion. Of the 10 participating medical schools, 4 are private institutions and 6 public, with representation from a variety of geographic locations. For a list of participating medical schools, please see Table 1.

Gender was provided by 979 of participants; of these, 55% were women ($n = 540/979$). Age of study participants ranged from age 19 to 44 years old, with a mean and median age of 25 years. Caucasians made up the majority of the subject population (80%; $n = 754/947$), with Asian students constituting 8% ($n = 78/947$), Hispanic or Caucasian/Hispanic students 5% ($n = 50/947$), and African-American students 4% ($n = 36/947$). Basic demographic information is detailed in Table 2.

Students in each year of medical school participated, with 29% 4th-year, 22% 3rd-year, 20% 2nd-year, and 26% 1st-year students. Fifty-nine percent ($n = 600/1,014$) of students had not yet completed the required medical school clerkship in surgery at the time of the survey. When asked about their interest in a surgical field, 58% of men and 43% of women agreed that they were currently open to a career in surgery ($p < 0.001$), and 42% of men and 28% of women agreed that they were very strongly leaning toward a career in surgery ($p < 0.001$). At the time of the survey, 11% of men and 9% of women listed general sur-

Table 2. Demographic Information of Survey Respondents

Demographics	Male		Female	
	n	%	n	%
Gender ($n = 979$)*	439	45	540	55
Race/ethnicity ($n = 945$)*	422	—	523	—
Caucasian	340	81	411	79
Asian	29	7	49	9
African American	9	2	28	5
Hispanic or Caucasian/Hispanic	29	7	21	4
Other	15	4	14	3
Mean age (y) ($n = 975$)*	26	—	25	—
Year of graduation ($n = 977$)*	438	—	539	—
2008	126	29	160	30
2009	101	23	111	21
2010	80	18	114	21
2011	114	26	136	25
Other	17	4	18	3

*Total number of respondents who provided this demographic information.

gery as their intended postgraduate specialty. Orthopaedics was selected as the intended postgraduate specialty by 12% of men and 3% of women, neurosurgery by 4% of men and 1% of women, otolaryngology by 5% of men and 1% of women, and urology by 2% of men and 1% of women.

Male medical students found a mentor of their same gender in surgery much more often than female medical students (71% versus 45%; $p < 0.001$). First-hand clinical exposure to the field of surgery before entering medical school was more common among male students, with 52% of men and 40% of women reporting this experience ($p < 0.001$). Men and women agreed equally that during their surgical clerkship, faculty and residents were encouraging and positive about a career in surgery (59% and 61%, respectively; $p = 0.676$). Teaching style in the 3rd-year surgery clerkship was considered intimidating by both male and female students (60% and 51%, respectively; $p = 0.198$), but both groups were pleased overall with their surgery clerkship grade (56% and 66%, respectively; $p = 0.094$).

More men than women indicated an interest in adding additional years to surgical residency training to include designated time for research, although this difference was not statistically significant (25% versus 19%, respectively; $p = 0.08$). Men were more likely to agree that it is more difficult to perform academic research in a surgical field than in other specialties (29% versus 20%; $p = 0.003$), although most students responded neutrally to this question.

Nine specific interventions designed to increase women's interest in surgery were then evaluated using a 7-point Likert scale. Students were asked to answer the question: "I

Table 3. Results of Collapsed Likert Scale Data

Question	Response*	Male		Female		p Value
		n	%	n	%	
80-hour work week	Agree	295/439	67	391/539	73	0.153
	Neutral	83/439	19	91/539	17	
	Disagree	61/439	14	57/539	11	
Part-time residency training	Agree	95/437	22	218/536	41	< 0.001
	Neutral	115/437	26	120/536	22	
	Disagree	227/437	52	198/536	37	
Integrated training programs	Agree	304/439	69	375/537	70	0.931
	Neutral	80/439	18	93/537	17	
	Disagree	55/439	13	69/537	13	
Parental leave more accepted	Agree	218/436	50	452/539	84	< 0.001
	Neutral	157/436	36	51/539	9	
	Disagree	61/436	14	36/539	7	
On-site child care	Agree	202/438	46	399/535	75	< 0.001
	Neutral	174/438	40	97/535	18	
	Disagree	62/438	14	39/535	7	
Part-time practice/flexible hours	Agree	306/438	70	466/538	87	< 0.001
	Neutral	83/438	19	44/538	8	
	Disagree	49/438	11	28/538	5	
Shared practice	Agree	262/437	60	388/536	72	< 0.001
	Neutral	118/437	27	108/536	20	
	Disagree	57/437	13	40/536	7	
More faculty of same gender	Agree	11/431	3	262/537	49	< 0.001
	Neutral	251/431	58	197/537	37	
	Disagree	169/431	39	78/537	15	
More residents of same gender	Agree	12/436	3	244/536	46	< 0.001
	Neutral	257/436	59	205/536	38	
	Disagree	167/436	38	87/536	16	

*Disagree = Likert 1-3, neutral = Likert 4, agree = Likert 5-7.

would be more interested in a surgical field if . . ." followed by a specific intervention (see Appendix online).

Seven of the nine interventions revealed a statistically significant gender difference. Women responded that they would be more interested in surgery if a 6-week maternity or paternity leave were more accepted during residency ($p < 0.001$); if child care were available at their hospital of employment, either as a resident or attending physician ($p < 0.001$); if part-time residency training were an option ($p < 0.001$); if part-time practice were commonplace ($p < 0.001$); if a clinical practice could be split with a colleague ($p < 0.001$); and if there were more surgical faculty ($p < 0.001$) and residents of their same gender ($p < 0.001$).

The two remaining interventions, male and female students agreed equally that the interventions would enhance their interest in surgery. Male and female students both responded that they would be more interested in a surgical field if surgical programs strictly adhered to the 80-hour work week ($p = 0.153$). In addition, students of both genders agreed that if surgical programs combined residency

and fellowship programs into a shorter, joint training program, they would be more interested in surgery ($p = 0.931$). Although these interventions would not target female students specifically, they would likely enhance interest in a surgical career among all students. For complete survey data, please refer to Table 3.

We also performed separate analyses using data from students who had and had not completed the 3rd-year surgical clerkship and those who had finished the clerkship, as students who have had experience on a surgical rotation would likely have a more realistic understanding of a surgical profession than preclinical students. Although the results using only responses from preclinical students mirrored the overall results, the findings differed slightly when looking only at responses from students who had completed the clerkship. Women were still more likely to agree to an increased interest in surgery if taking a 6-week maternity or paternity leave were more accepted or supported during residency ($p < 0.001$); if child care were available on site at their hospital of employment ($p < 0.001$); if

part-time practice/flexible hours were commonplace in surgical practices ($p = 0.01$); and if there were more surgical faculty ($p < 0.001$) and residents ($p < 0.001$) of their same gender.

Men and women who had completed the clerkship both agreed that they would be more interested in surgery if surgical residency programs strictly adhered to the 80-hour work week; if surgical programs combined residency and fellowship programs into a shorter, joint training program; and if they could split a surgical practice with a colleague. Interestingly, the majority of all students who had completed the surgical clerkship, male and female, would not be more interested in surgery if part-time residency training, with an increase in the total number of years of training, were an option.

DISCUSSION

Previous studies have demonstrated that women begin medical school less interested in a surgical discipline than men (6% versus 20%), and as many as 76% of women lose their interest in surgery during medical school, compared with 50% of men.¹¹ In addition, women are less likely than men to develop a new interest in surgery during medical school (6% versus 19%).¹¹ Our survey similarly showed that during medical school, women medical students are less likely than men to be open to or leaning toward a career in surgery. With this study, we sought to evaluate specific interventions that might reverse this phenomenon and promote women's interest in surgery both before and during medical school.

Consistent with previous studies, male and female medical students agreed that their interest in surgery would increase if surgical residency programs adhered strictly to the 80-hour work week. An earlier survey of medical students demonstrated that students had a more favorable impression of a surgeon's lifestyle and work hours after implementation of the 80-hour work week when compared with students who completed their surgical clerkship before the work-hour limitation.¹² In another report, 92% of medical students perceived the change to an 80-hour work week as positive, with the most common reason cited being an improvement in resident lifestyle.¹³

Regardless of gender, students also agreed that they would be more interested in surgery if surgical residency and fellowship programs were combined into a shorter, joint training program. With approximately 80% of general surgery residency graduates pursuing additional training, many medical students perceive the length of general surgery and fellowship training to be prohibitive.¹⁴ In a recent study, women expressed an increased concern about the length of surgical residency training as compared with

men.¹⁵ Plastic surgery has successfully implemented an integrated training program, and currently there are 9 Accreditation Council for Graduate Medical Education-accredited integrated vascular surgery programs consisting of 5 total years of training.¹⁶ There are no studies to date assessing the success or efficacy of such programs, but combined programs can serve as one way to attract more men and women to a career in surgery and surgical subspecialties.

In this study, women agreed more often than men that they would be more interested in surgery if a part-time training option existed, even if it meant the total number of years of residency training were increased. This is consistent with the findings in a previous report by Saalwachter and colleagues,¹⁷ in which 36% of female and 24% of male medical students reported that they would be more interested in surgery if part-time training were an option. For more than 10 years, the University of California San Francisco Pediatrics Residency Program has offered a flexible option in which residents work between 6 and 8 months per year and can take up to 5 years to complete the required training. Although the program does not offer true part-time work, but rather selected periods of leave, recent data indicate that 57% of participating residents viewed this program as critical to their success. The majority of their colleagues in the standard residency perceived the program as having either a positive or neutral effect on their own experience (43% and 33%, respectively). In addition, scores on the American Board of Pediatrics examination among all residents were equivalent.¹⁸

Pregnancy, maternity leave, and child care during surgical residency are complex issues. Many different factors can play into women's perceptions of childbearing during surgical residency, including both the stress and impact of pregnancy and childrearing on training, leave limitations set by the American Board of Surgery, and redistribution of work responsibilities to fellow residents to accommodate time off. Not surprisingly, several studies have shown that women in surgery intentionally delay having children more often than men, most often until the completion of all surgical training.^{10,19} In fact, from 1997 to 2001, only 2% of all female surgical residents had a child during their training, according to a survey of program directors.²⁰

Although official maternity leave policies vary across institutions, a 2001 survey of general surgery residency graduates demonstrated that 2 of 3 surgeons who did choose to have children during residency would have preferred to have had more time off during residency, with men preferring a 1- to 3-month leave and women preferring 3 months. In terms of child care, 79% recommended that employers provide child care facilities at work.¹⁰ These data

suggest that, although complex, the issues of maternity leave and child care are important ones in considering a career in surgery.

Based on our findings, maternity leave and child care during residency training are considered heavily by medical students, especially women, when selecting a specialty. In this study, 84% of women, compared with 50% of men, would be more interested in surgery if maternity or paternity leave were more accepted or supported during residency. In addition, 75% of women agreed that having child care available on site at one's hospital of employment, either as a resident or attending physician, would increase their interest in surgery, as compared with 46% of men.

In a survey of women general surgeons, 57% suggested that the best way to increase the number of women pursuing a career in general surgery would be to enable surgeons to participate in a shared or part-time practice.⁶ Another study showed that > 80% of general surgery residency graduates surveyed would consider a part-time surgical practice to allow more parenting involvement.¹⁰ Similarly, we found that female students were more likely to agree to an increased interest in the field of surgery if they could split a surgical practice with a colleague or if part-time practice were more commonplace.

Finally, with this survey, we showed that women are much less likely than men to meet a same-gender role model within the field of surgery. Even more striking is that 46% to 49% of women agreed that they would be more interested in surgery if there were more surgical residents or faculty of their same gender, as compared with only 3% of men. Previous reports have similarly shown that women are less likely than men to meet a same-gender role model in surgery and that those who do are more likely to pursue a surgical career.^{6,7} Women more often list gender distribution as a factor in their career choice or in the selection of a specific residency program.^{15,21} In 1 study of 7 medical schools with different proportions of women surgeons, 88% of the female students who chose a career in surgery had attended 1 of 3 schools in which 40% or more of the surgical faculty were women.⁷ It will be important to increase the number of female surgical faculty at academic centers, particularly those in leadership positions, and to create opportunities for mentorship with medical students, as this can have a tremendous impact on specialty selection.

Although this study reflects data from 10 medical schools and 1,019 subjects, there are several limitations. With a 22% response rate and with all questionnaire-based studies, data are subject to nonresponder bias. Given the large subject population, geographic diversity of the participating medical schools, and anonymous reporting, we hope to have minimized the effects of such bias. In addition,

the calculated response rate for this survey is approximate and relies on an accurate report of survey distribution by the Dean of Student Affairs at participating schools. Finally, the wording of the survey questions implies that a surgical residency and career are different from those of nonsurgeon physicians. We cannot exclude the possibility that these same interventions, when applied to other specialties, could also increase students' interest in those specialties as well.

As long as increasing numbers of medical students continue to select controllable lifestyle specialties, the surgical disciplines will have to compete to attract talented students. Although a surgical profession, by nature, will likely never denote a controllable lifestyle, by making some changes to appeal to a more diverse medical student body, the field can maintain its historically strong applicant pool. In conclusion, we have identified seven interventions that could specifically promote women's interest in surgery. Although some of these changes are more immediately feasible than others, all necessitate some willingness toward adaptation among the surgical culture. To establish a diverse surgical workforce and to attract the most talented students to the field, medical schools and residency programs should consider taking steps to implement these interventions.

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