Association of Women Surgeons

Female military medical school graduates entering surgical internships: are we keeping up with national trends?

Amy Vertrees, M.D., F.A.C.S. a,b,* Nicole Laferriere, B.S. b, Eric Elster, M.D., F.A.C.S. a,b, Craig D. Shriver, M.D., F.A.C.S. a,b, Norman M. Rich, M.D., F.A.C.S. b

aWalter Reed National Medical Center, Bethesda, MD, USA; bNorman M. Rich Department of Surgery, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD 20814, USA

KEYWORDS: Women resident; Medical student; General surgery; Surgical subspecialty; Female resident

Abstract

BACKGROUND: Ratios of women graduating from the only US military medical school and entering surgical internships were reviewed and compared with national trends.

METHODS: Data were obtained from the Uniformed Services University of the Health Sciences graduation announcements from 2002 to 2012.

RESULTS: There were 1,771 graduates from 2002 to 2012, with 508 female (29%) and 1,263 male (71%) graduates. Female graduates increased over time (21% to 39%; P < .014). Female general surgery interns increased from 3.9% to 39% (P = .025). Female overall surgical subspecialty interns increased from 20% in 2002 to 36% in 2012 (P = .046). Women were represented well in obstetrics (57%), urology (44%), and otolaryngology (31%), but not in neurosurgery, orthopedics, and ophthalmology (0% to 20%).

CONCLUSIONS: The sex disparity between military and civilian medical students occurs before entry. Once in medical school, women are just as likely to enter general surgery or surgical subspecialty as their male counterparts. Increased ratio of women in the class is unlikely to lead to a shortfall except in specific subspecialties.

Published by Elsevier Inc.

The percentage of female medical students has increased over time; however, the ratio of women entering surgical training has not.1 This sex discrepancy may exacerbate the projected shortfall of general surgeons over time.2 Several studies have investigated the reasons why women are, or are not, going into surgery and surgical subspecialties (SS). Suggested reasons that may make a surgical career less attractive for female medical students include lifestyle issues, lack of mentors, and perception of sex discrimination.3–6

The military is a unique environment currently with an overall low percentage of women (14.6% active duty and 19.5% of reserves).7 The Uniformed Services University of the Health Sciences (USUHS) is the only military medical school in the United States. The school was chartered by an
act of Congress in 1972 as part of a campaign for military scholarship programs and to create career military physicians. Accepted USUHS students are commissioned into the Army, Navy, Air Force, or Public Health Service and receive all of the salary and benefits of a junior active duty military officer ($5,356 per month at present) and do not incur any monetary debt for tuition or issued textbooks. The student does incur a service obligation of active duty to their branch of service for 7 years after their residency. The mission of USUHS is to train, educate, and prepare uniformed services health professionals, officers, and leaders to directly support the Military Health System, the National Security and National Defense Strategies of the United States, and the readiness of our Armed Forces.

Given the overall low percentage of women in the military, the percentage of female medical students applying, entering, and graduating from USUHS would be predicted to be lower than civilian medical school. Additionally, the percentage of female medical students entering general surgery (GS) and SS from USUHS is not known. We sought to identify the percentage of women applying, entering, and graduating from USUHS and determine the percentage that continued into GS and SS. These percentages will be compared with civilian data to determine if there is a difference in female graduation from military medical school as well as differences in overall interest of pursuing careers in the surgical field. If no discrepancy is found, perhaps there are further insights that may be learned in recruiting women into surgical specialties for civilian residencies.

Methods

This retrospective review was performed under an approved protocol (#388320-1) through the Walter Reed Institutional Review Board. Graduation announcements published in the Student Affairs Office at Uniformed Services University were reviewed. If the sex was not obvious from the name on the announcement, pictures of the students taken for class photos posted in the hallways at USUHS were used to identify the sex of the student. The location of the internship and the internship specialty were noted. Classification included GS alone (categorical) and the overall categorical SS (GS, urology, neurosurgery, otolaryngology [ENT], obstetrics and gynecology [OBGYN], ophthalmology, orthopedics). Nonspecific categories of “transitional internship” were not included in the SS grouping. Some SS were not categorical, and interns were designated as GS. Application and matriculate information were obtained from the Admissions Office at USUHS. The number of applicants, matriculates, and sex were noted.

Statistics

The trend in the percentage of women over time was examined using the Mantel–Haenszel linear-by-linear association test. Data were analyzed using IBM SPSS Statistics for Windows version 21.0 (IBM Corp. Armonk, NY).

Results

Applicants and matriculants

From 1998 to 2008 (graduating class 2002 to 2012), there was a significant increase in female applicants and matriculants to USUHS over time from 30% to 35% ($P = .014$; Fig. 1). The percentage of entrants equaled the percentage that graduated (not shown), the attrition rate was not significant once they entered USUHS. The percentage of female graduates from USUHS is significantly different than overall US graduates at consistently 15% less (Fig. 2).

General surgery internship

There was a significant increase in the percentage of women entering GS internship, from a low of 4% in 2002% to 39% in 2012 ($P = .025$). This increase closely followed the increase in women graduating (Fig. 3). There was a decrease in female graduates entering GS internships for the graduating class of 2008 to 2010, corresponding to applicants applying in 2003 to 2005 for entry into the 2004 to 2006 classes. This time frame included the early stages of 2 ongoing wars in Iraq and Afghanistan. Although the majority of female graduates entered GS internships (Fig. 4), the overall percentage entering GS versus the class percentage over the last 10 years fell short (23% vs 29%; Fig. 4, Table 1). In the last 2 years (2011 to 2012), there were a greater percentage of women entering GS internship compared with the class ratio (Fig. 3).

Surgical subspecialties

There was a significant increase in the percentage of women entering surgical specialty internship (including
GS), from 20% in 2002 to 36% in 2012 ($P = .046$) with an interval decrease in female graduates from 2009 to 2010 (28% and 14%). This increase closely followed the increase in women graduating (Fig. 3). There was a decrease in female graduates entering GS internships for the graduating class of 2009 to 2010, corresponding to applicants in 2005 to 2006, also during the time frame of the early stages of 2 ongoing wars in Iraq and Afghanistan.

The most common subspecialty after GS was OBGYN (Fig. 4). More OBGYN spots between 2002 and 2012 were filled by women compared with men (57% vs 43%; Table 1). There was significant variability over the years (Table 2). Urology and ENT were well represented compared with the overall percentage of women in the class (44% and 31% vs 29% overall, Table 1). Neurosurgery, ophthalmology, and orthopedics were consistently poorly represented (Tables 1 and 2).

**Conclusion**

Determining the reasons that medical students choose or did not choose SS is important to prevent the predicted shortfall, especially in GS. The main presumption is that women find surgical careers less attractive than other specialties. Lack of mentors, lifestyle issues, and perceptions of differing treatment compared with male counterparts are areas that have been mentioned as contributing factors. $^3$–$^6$ The military has a low percentage of women, so we hypothesized that USUHS, the only military medical school, would attract fewer female applicants and therefore have fewer female graduates than civilian medical school. The percentage going into SS had not been studied, so we sought to determine if the percentage of female graduates was proportional to the class or whether that was an area of predicted shortfall.

Female graduates from the US medical school are nearly equal to their male counterparts (48% in 2011). $^1$ Davis et al $^2$ noted that the sex gap of US medical students entering GS appears to be closing, but not quite equal yet (33% of 2005 graduates, up from 27%). Although there was an increase in medical school applicants to USUHS for the graduating classes of 2002 to 2012, it has not reached the pace of civilian medical schools. $^1$ There has been a significant increase in female graduates from

---

**Figure 2** Percentage of female graduates from USUHS and from overall US medical schools.

**Figure 3** Comparison of overall percentage of female graduates of the class versus those entering surgical subspecialties or specifically general surgery.
USUHS to over 30%, but it is still far short of the nearly 50% rate of female US civilian medical schools.

Although the applicant ratio of women has increased over time, the percentage of women entering and graduating from USUHS has recently outpaced this increase. If the current trend continues, the sex distribution might be equal in the next 10 to 20 years. The percentage entering into GS and SS has also demonstrated a higher pace of increase than applicants. Over the last 2 years of this study, ratios of women in GS and surgical specialties outpaced the class with nearly 40% of the female graduates are entering the surgical specialties in 2011 and 2012 in classes with percentages of overall women in the 30% range. Although this is encouraging for avoiding a potential shortfall in the overall categories of surgical specialty, individual specialties have not been well represented. OB/GYN is a specialty that has historically been attractive to women. At USUHS, women were well represented in OB/GYN, urology, and ENT, but were poorly represented in neurosurgery, ophthalmology, and orthopedics. If the trend of increased female graduates entering surgical specialties continues, and they continue to not enter certain subspecialties, this may result in a significant shortfall in those areas. These subspecialties will need to identify why women are not choosing those specialties, and recruiting women should be a priority to avoid shortage.

The evenly matched ratio of female graduates and those choosing surgical specialties at USUHS may be explained by the inherent differences in civilian and military obligations creating a selection bias. Military training has many benefits, especially avoiding the substantial debt of civilian medical schools. As a consequence, military service is necessary, with loss of choice for area of practice and deployments to war zones. A significant amount of flexibility is lost, specifically location of practice because there are limited number of medical centers in the military and the high potential for deployment. Previous studies have noted that the ability to choose location of practice and the possibility of part-time work is an important factor in attracting female residents. A Swiss study of surgical residents revealed that work and time-related characteristics and patient interactions were more important than career-related aspects. On the other hand, Incorvaia et al noted that among the factors for choosing a surgical specialty, a passion for surgery was the number one reason, more than lifestyle, potential salary, repayment of debt, or length or intensity of training.

The demands of the military do not allow part-time work, an area of attraction that is possibly generational, but noted specifically with women. Wendel et al noted that more than 80% of women surveyed would consider part-time work. A French study noted that there are more women in SS likely from an effort for reduction of work time and more part-time opportunities. This is not currently an option in the war-engaged military, but perhaps in the garrison setting, allowing part-time work and extending the obligation may attract more women to the surgical fields.

After the drop of female percentage in the graduating class of 2008 to 2010, there was a greater surge of women entering surgical specialties in 2011 and 2012. The cause of this drop is unclear. The graduates would have applied for medical school in 2003 to 2005, entering medical school in 2004 to 2006. The uncertainty of war may have contributed to this drop, with a recovery over time as the nation adapted

---

**Figure 4** Distribution of surgical specialties among female graduates.

**Table 1** Residency choices of USUHS students by specialty

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Surgery</td>
<td>61 (23)</td>
<td>204 (77)</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>14 (31)</td>
<td>31 (69)</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>0</td>
<td>5 (100)</td>
</tr>
<tr>
<td>Obstetrics and Gynecology</td>
<td>36 (57)</td>
<td>27 (43)</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>4 (20)</td>
<td>16 (80)</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>10 (17)</td>
<td>48 (83)</td>
</tr>
<tr>
<td>Urology</td>
<td>7 (14)</td>
<td>9 (56)</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>9 (15)</td>
<td>51 (85)</td>
</tr>
<tr>
<td>Dermatology</td>
<td>8 (38)</td>
<td>13 (62)</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>13 (19)</td>
<td>55 (81)</td>
</tr>
<tr>
<td>Family Medicine</td>
<td>82 (32)</td>
<td>178 (68)</td>
</tr>
<tr>
<td>Internal Medicine</td>
<td>67 (25)</td>
<td>202 (75)</td>
</tr>
<tr>
<td>Neurology</td>
<td>2 (20)</td>
<td>8 (80)</td>
</tr>
<tr>
<td>Pathology</td>
<td>2 (11)</td>
<td>16 (89)</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>98 (52)</td>
<td>89 (48)</td>
</tr>
<tr>
<td>Physical Medicine and Rehabilitation</td>
<td>0</td>
<td>6 (100)</td>
</tr>
<tr>
<td>Psychology</td>
<td>30 (38)</td>
<td>50 (63)</td>
</tr>
<tr>
<td>Radiology</td>
<td>4 (10)</td>
<td>38 (90)</td>
</tr>
<tr>
<td>Transitional</td>
<td>56 (21)</td>
<td>211 (79)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

Percentage of female students in parenthesis. Miscellaneous includes Aerospace Medicine, Internal Medicine/Family Medicine, Pediatric Neurology, Psychiatry/Internal Medicine, Preventive Medicine, and Radiation Oncology. Percentage in parenthesis.
to being at war. There was a surge in troop numbers into Iraq in 2007, which may have boosted confidence in the war efforts, or brought more attention to the war effort. Perhaps the uncertainty of deployment and wartime service further selected in favor of women that were less likely to be intimidated by the demands of a surgical career. As most are aware that military service involves travel, this likely presents in medical school and residency, and that has additional pressures. Pregnancy and the negative stigma are likely present in medical school and residency, and that has been noted before.15

With 2 concurrent wars, and surgeons deploying fairly frequently (sometimes less than a year between deployments), deployment to a war zone was certain after graduation. Although the uncertainty of wartime service is likely to affect the interest of both sexes for the military, women have additional pressures. Pregnancy and the negative stigma are likely present in medical school and residency, and that has been a factor for women’s choice.3,4,14 Assuming that USUHS is selecting for those who would be more likely to choose a surgical career, better understanding the motivation for joining the military and entering USUHS may provide a target for civilian recruitment. It also highlights that recruiting for surgical specialties should start before medical school, and while it is certainly true for USUHS, this is also likely true for civilian medical schools, an imperative which has been noted before.15

There are limitations to this retrospective review of data. Although many presumptions are made from the changes noted over time, without direct communication with graduates with interviews or surveys, it is impossible to tell exact reasons for the increase in women pursuing military medical and specifically surgical specialties. These data are for USUHS, the military medical school, and does not account for the contribution of the Health Professions Scholarship Program participants at civilian medical schools that receive payment of their education and a limited stipend in exchange for a shorter military commitment (often 4 to 5 years). Health Professions Scholarship Program students will graduate from their civilian medical school and enter military residencies with USUHS students, followed fulfillment of their commitment to military service.

USUHS requires a significant military commitment and may select for applicants who will be less intimidated by the commitment of a surgical career. Although the percentage of female graduates of USUHS is less than civilian medical school, the percentage of female graduates entering SS parallels the graduate ratio; therefore, there is unlikely to be a long-term loss of surgeons. Although the increased ratio of women graduating from USUHS over time is unlikely to lead to a shortfall in overall SS, specific SS may be affected, especially neurosurgery, orthopedics, and ophthalmology. Further study should look into the specific motivations fueling these choices, and how we can utilize what is learned to continue to recruit both male and female students into the surgical specialties. Uncertainty in the environment, specifically wars for prospective USUHS students, likely influence applicants to medical school and those entering into surgical specialties; therefore, recruitment may be aided by fighting for stable and flexible environments.

References