

# Does sex affect residency application to surgery?

Mark Otto Baerlocher, MD

**Objective:** To determine whether women are proportionately undersampled at the level of the annual residency match. **Methods:** Data were obtained from the Royal College of Physicians and Surgeons of Canada and the Canadian Residency Matching Service. The odds of men being rejected from their top choice of surgical discipline were compared with the corresponding odds for women for the surgical specialties of general surgery, orthopedic surgery, neurosurgery, otolaryngology, urology, cardiac surgery and plastic surgery. **Results:** Women continue to be underrepresented among surgery residents and surgeons in practice; however, the number of women has increased. Neither sex was overselected among the surgical specialties examined. **Conclusions:** There was no evidence of overselection of either sex at the level of the annual resident selection committee.

**Objectif :** Déterminer si les femmes sont, toutes proportions gardées, moins sélectionnées au niveau du jumelage annuel des résidents. **Méthodes :** On a obtenu des données du Collège royal des médecins et chirurgiens du Canada et du Service canadien de jumelage des résidents. On a comparé les chances pour les hommes et pour les femmes de voir leur premier choix de discipline chirurgicale refusé dans le cas des spécialités chirurgicales suivantes : chirurgie générale, chirurgie orthopédique, neurochirurgie, otorhinolaryngologie, urologie, chirurgie cardiaque et chirurgie plastique. **Résultats :** Les femmes demeurent sous-représentées parmi les résidents en chirurgie et chez les chirurgiens actifs, mais leur nombre a augmenté. Ni l'un ni l'autre des deux sexes ne fait l'objet d'une sursélection dans les spécialités analysées de la chirurgie. **Conclusions :** Rien n'indiquait une sursélection de l'un ou l'autre des deux sexes au niveau du comité de la sélection annuelle des résidents.

Medical students have historically been mostly men, and consequently, the current physician workforce in Canada is male-dominated. This is set to change with increasing numbers of women entering medical school. In the United States, for example, over 25% of practising physicians and 50% of matriculating medical students are women,<sup>1</sup> while in Canada there have been about equal numbers of men and women in medical school for the past decade.<sup>2</sup> Nonetheless, surgical specialties are often seen as being more likely to be discriminatory toward women than other specialties; for example, Ferris and colleagues<sup>3</sup> found that some 63 of a possible 413 (15%) Canadian female

surgeons reported discrimination during the process of residency selection (and even more reported discrimination during training).

Previous work has found that women are overselected in the annual residency match when data for all specialties are combined; specifically, they are overselected for psychiatry, family medicine and emergency medicine.<sup>4</sup> However, neither sex was overselected among the surgical specialties when the data for all surgical specialties were combined. Recognizing that not all surgical specialties were born equal, the present article examines the surgical specialties individually to determine whether sex affects success rate among medical

students applying for surgical residencies at the 13 English Canadian university medical training centres.

## Materials and methods

Data regarding the age of surgeons currently in practice and registered with the Royal College of Physicians and Surgeons of Canada (RCPSC) by sex were obtained from the RCPSC ([www.rcpsc.medical.org](http://www.rcpsc.medical.org)). Data regarding the numbers of applicants ranking a surgical discipline as their first choice and the numbers of these successfully matching to their first-choice discipline, sorted by sex, were obtained from the Canadian Residency Matching Service (CaRMS) ([www.carms.ca](http://www.carms.ca)).

*Radiology Residency Training Program, University of Toronto, Toronto, Ont.*

*Accepted for publication Feb. 16, 2006*

**Correspondence to:** Dr. Mark Otto Baerlocher, 13 Marshview Dr., Sackville NB E4L 3B2; [Mark.Baerlocher@utoronto.ca](mailto:Mark.Baerlocher@utoronto.ca)

To determine whether sex affected success rate among those applying to surgical residency programs, the odds for men of rejection from their top choice of discipline were compared with the corresponding odds for women. Data were combined for a 10-year period (1996–2005 inclusive). These data are shown in Table 1. For example, for general surgery, a total of 192 women ranked a general surgery residency program as their top choice, compared with 366 men. Of these, 174 women and 316 men successfully matched to a general surgery program, equal to a 91% and 86% success rate for women and men, respectively. This is equal to men having odds of being rejected that were 1.53

times higher than the corresponding odds for women (not statistically significant,  $p = 0.18$ ).

### Results

Among practising physicians registered with the RCPSC, men dominated in all surgical specialties examined (Table 2). Women were least represented in urology and most represented in plastic surgery. Women were represented more at the younger ages in all surgical specialties except cardiac surgery; in particular, they were represented more in general surgery.

There was no evidence of statistically significant overselection of either

sex at the level of the annual residency match (Table 1). When all surgical specialties examined are combined, men had an odds ratio of being rejected from their first choice of discipline that was 0.97 that of women ( $p = 0.79$ ).

### Discussion

The data show that female physicians remain very underrepresented among surgeons in practice (Table 2), with anywhere from 7 times the number of men as women in plastic surgery to 25 times the number of men as women in urology. Although female representation has increased over the years, illustrated by the greater representation

**Table 1**

**Number of graduating medical students participating in the Canadian Residency Matching Service ranking a surgical residency discipline as their first choice and number of these matched to their first choice surgical discipline, by sex, 1996–2005 (inclusive)**

Specialty	Group; no. of medical students ranking discipline as first choice		Group; no. of medical students matching to first-choice discipline		Group; ratio of medical students matching to first-choice discipline		OR*† (95% CI)	<i>p</i>
	Female	Male	Female	Male	Female	Male		
General surgery	192	366	174	316	0.91	0.86	1.53 (0.87–2.7)	0.18
Orthopedic surgery	79	370	60	294	0.76	0.79	0.82 (0.46–1.5)	0.59
Neurosurgery	20	114	18	97	0.90	0.85	1.58 (0.34–7.4)	0.82
Otolaryngology	51	177	34	105	0.67	0.59	1.37 (0.71–2.6)	0.43
Urology	41	195	26	130	0.63	0.67	0.87 (0.43–1.7)	0.83
Cardiac surgery	17	90	9	53	0.53	0.59	0.79 (0.28–2.2)	0.85
Plastic surgery	101	181	35	74	0.35	0.41	0.77 (0.46–1.3)	0.37
Surgeries combined	501	1493	356	1069	0.71	0.72	0.97 (0.77–1.21)	0.79

OR = odds ratio; CI = confidence interval.

\*Fisher's exact test.

†Ratio of odds of men being rejected from first choice of discipline to corresponding odds for women.

**Table 2**

**Female: male ratios of surgeons registered as fellows in good standing of the RCPSC, by age, as of January 2005**

Age, yr	Specialty; ratio						
	General surgery	Orthopedic surgery	Neurosurgery	Otolaryngology	Urology	Cardiac surgery	Plastic surgery
< 45	0.39	0.13	0.10	0.28	0.11	0.08	0.24
45–54	0.13	0.06	0.06	0.14	0.05	0.00*	0.16
55–64	0.05	0.01	0.04	0.03	0.00*	NA†	0.08
> 64	0.01	0.00*	0.00*	0.02	0.00*	NA†	0.00*
All	0.11	0.06	0.06	0.12	0.04	0.08	0.14

RCPSC = Royal College of Physicians and Surgeons; NA = not applicable.

\*Indicates no women in these categories, and therefore, ratio is 0.

†A meaningful value could not be calculated because no members of either sex were registered with the RCPSC.

Table 3

Ratio of odds of rejection for male applicants from first choice of residency discipline compared with corresponding odds for female applicants, 1996–2000 and 2001–2005

Specialty	1996–2000 OR*† (95% CI)	<i>p</i>	2001–2005 OR*† (95% CI)	<i>p</i>
General surgery	1.23 (0.63–2.40)	0.66	2.46 (0.68–8.90)	0.26
Orthopedic surgery	0.65 (0.31–1.40)	0.34	1.09 (0.42–2.80)	0.86
Neurosurgery	1.05 (0.11–10.10)	0.97	2.00 (0.23–17.30)	0.85
Otolaryngology	1.58 (0.59–4.20)	0.50	1.22 (0.51–3.00)	0.82
Urology	0.87 (0.30–2.50)	0.79	0.87 (0.34–2.20)	0.95
Cardiac surgery	0.38 (0.06–2.30)	0.52	1.10 (0.28–4.30)	0.89
Plastic surgery	0.71 (0.34–1.50)	0.47	0.82 (0.41–1.70)	0.71
Surgeries combined	0.85 (0.62–1.20)	0.33	1.11 (0.80–1.50)	0.57

OR = odds ratio; CI = confidence interval.  
\*Fisher's exact test.  
†Ratio of odds of men being rejected from first choice of discipline to corresponding odds for women.

of women among the younger age groups, women remain underrepresented even at the youngest age group (< 45 yr).

The data also show that this lack of women in the surgical specialties is not due to sex discrimination at the level of the resident selection committees, because women were not statistically more likely to be rejected from their top choice of surgical discipline than men (Table 1). This suggests that other factors play a role. These may include a lack of interest in surgical specialties among women or lifestyle considerations. At earlier stages, sex discrimination remains a possibility as well; for example, female medical students may perceive themselves to be discriminated against during surgical rotations and therefore not apply. Although I cannot provide any anecdotal information or personal experience, readers will note that I am male and therefore not as likely to experience this as a female

trainee. I do believe it is likely, however, that there are some surgeons who discriminate against women and that this may be perceived by some female trainees. Fortunately, these surgeons do not appear to play a significant role at the level of residency selection committees.

Unfortunately, the data cannot distinguish between these possibilities. The data do show, however, that fewer women rank a surgical specialty as their top choice in the annual resident match.

To look for evidence of a change, I also compared the data from the first 5 years of the data set to the last 5 years (Table 3). There was no statistically significant difference (i.e., men were at least as likely to be rejected as women).

Finally, the reader should note that it is possible that sex discrimination does still occur at the level of residency selection committees, and although the data presented were

population data, it is possible that, if additional years' worth of data had been included, a statistically significant difference might have become evident.

## Conclusions

Four conclusions can be drawn from this report:

1. Women remain underrepresented among all of the surgical specialties.
2. Female representation has increased among all surgical specialties except cardiac surgery.
3. Fewer women apply to the surgical specialties.
4. Over- and under-selection by sex does not occur at the level of the annual resident match.

**Acknowledgements:** I thank the Royal College of Physicians and Surgeons of Canada and the Canadian Residency Matching Service for graciously providing the necessary data.

**Competing interests:** None declared.

## References

1. Association of American Medical Colleges. *Women in U.S. Academic Medicine Statistics 2002–2003*. Washington: The Association; 2003.
2. Baerlocher MO, Walker M. Does gender impact upon application rejection rate among Canadian radiology residency applicants? *Can Assoc Radiol J* 2005;56:232–7.
3. Ferris LE, Mackinnon SE, Mizgala CL, et al. Do Canadian female surgeons feel discriminated against as women? *CMAJ* 1996;154:21–7.
4. Baerlocher MO, Detsky AS. Does gender affect success rate amongst Canadian residency applicants? *CMAJ* 2005;173:1439–40.