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Decline in Popularity of General Surgery as a Career Choice in North America: Review of Postgraduate Residency Training Selection in Canada, 1996–2001

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Abstract. There has been a perception that fewer medical students are currently pursuing careers in general surgery. To investigate the validity of this premise we reviewed the Canadian Residency Matching Service (CaRMS) database from 1996 to 2001 and identified recent trends in graduates' selections. Three surgical specialties—general surgery, orthopedic surgery, obstetrics and gynecology—were chosen for analysis as “poor lifestyle” specialties. They were compared to anesthesia, diagnostic radiology, and ophthalmology, which were chosen as representative “good lifestyle” specialties. Linear regression and chi-square analyses were performed to identify significant changes in applications to each specialty. A negative trend in first-choice applications to all three “poor lifestyle” specialties was observed, whereas all three “good lifestyle” specialties experienced increased first-choice applicants. Potential factors influencing medical student residency selection are discussed, emphasizing the reduced number of first-choice applicants to general surgery.

There has been a perceived decline in the number of graduating medical students applying to general surgery residencies. This perception has arisen in the United States with the identification of a trend toward surgical programs matching lower ranked residents than in previous years and leaving an increasing number of positions vacant [1]. These findings have in part been attributed to medical schools encouraging their students to pursue careers in primary care. However, objective data demonstrating a decrease in applicants to general surgery programs remains elusive [1, 2].

The perceived decline in popularity of general surgery may also be a reflection of attitudinal changes among medical students, with greater emphasis being given to lifestyle considerations. The purpose of this study was to obtain national data on recent postgraduate residency match results and to identify trends in residency selection.

Materials and Methods

The Canadian Residency Matching Service (CaRMS) is a non-profit organization established in 1993 that provides a centralized residency matching service for all English-speaking Canadian medical school graduates. Information regarding career choices of

CaRMS applicants during the first iteration of the matching process was obtained from the CaRMS main office in Ottawa [3]. For the analysis, anesthesia, diagnostic radiology, and ophthalmology were chosen as “good lifestyle” specialties; and general surgery, obstetrics and gynecology, and orthopedic surgery were chosen as “poor lifestyle” specialties. Data from 1996 to 2001 were analyzed to identify trends in residency selection.

The number of first-choice applicants, the percentage of total applicants to CaRMS, and the number of vacant residency positions for each specialty following the first iteration of the match process were obtained for analysis. The numbers of first-choice applicants were then plotted against the corresponding year, and simple linear regression analysis was performed with a 95% confidence interval (CI) using the SPSS 10.1 program. Chi-square analysis was carried out to identify significant changes in the number of applications to each specialty.

Results

Analysis of the data demonstrated a negative trend in applications to the three “poor lifestyle” specialties (Fig. 1, Table 1). The number of first-choice applicants to general surgery was 72 (5.68%) in 1996 and dropped to 48 (4.25%) by 2001. Similarly, obstetrics and gynecology had 61 (4.81%) applicants in 1996 and only 38 (3.19%) in 2001. An analogous drop in applications to orthopedic surgery occurred during this time, with a reduction from 46 (3.63%) applicants in 1996 to 33 (2.92%) in 2001. Linear regression analysis confirmed a negative trend for all three specialties, achieving statistical significance for general surgery and obstetrics and gynecology ($p < 0.05$). Chi-square analysis also demonstrated a statistically significant decrease in applicants to obstetrics and gynecology.

In contrast, “good lifestyle” specialties demonstrated a stable or increasing trend among applicants (Fig. 2, Table 1). The number of first-choice applicants to anesthesia climbed from 39 (3.08%) in 1996 to 76 (6.73%) in 2001. Applications to diagnostic radiology rose from 46 (3.63%) in 1996 to 63 (5.58%) in 2001, and applications to ophthalmology increased from 31 (2.44%) in 1996 to 35 (3.10%) in 2001. Linear regression analysis revealed a positive trend for all three specialties, demonstrating a statistically significant increase in applications to anesthesia and diagnostic radiology

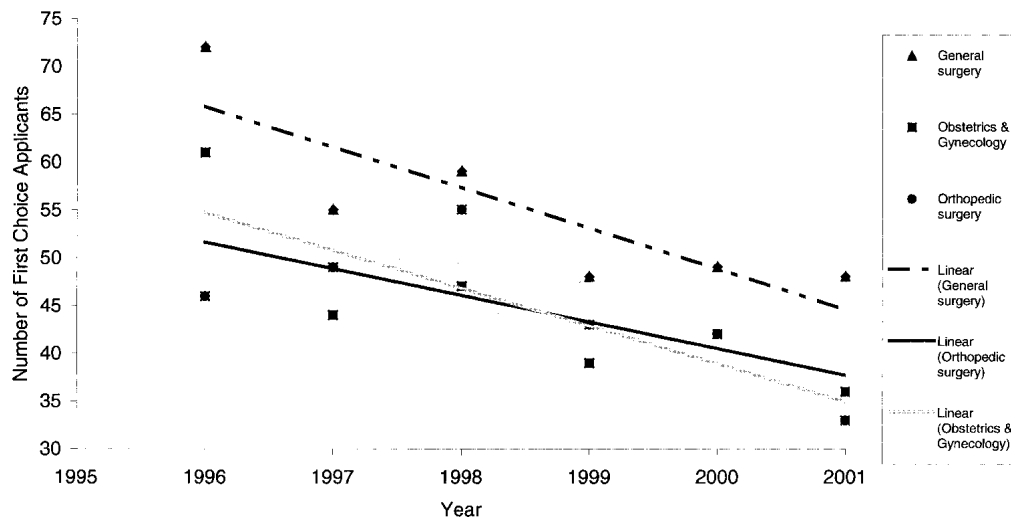


Fig. 1. Number of first-choice applicants to general surgery, obstetrics and gynecology, and orthopedic surgery through the Canadian Residency Matching Service (CaRMS) match from 1996 to 2001.

Table 1. Results of a simple linear regression analysis of the data presented in Figures 1 and 2.

Specialty	Slope	95% CI	Significance (<i>p</i>)
Anesthesia	7.29	4.32, 10.25	0.002
Diagnostic radiology	4.63	1.88, 7.37	0.009
General surgery	-4.26	-7.92, -0.60	0.032
Obstetrics and gynecology	-3.97	-7.47, -0.48	0.034
Ophthalmology	1.43	-1.96, 4.82	0.307
Orthopedic surgery	-2.80	-6.67, 1.07	0.115

95% confidence intervals (CI) were applied to the results.

($p < 0.05$). Chi-square analysis confirmed the increase in applications to anesthesia and diagnostic radiology.

The number of vacant positions after the first iteration of the match is shown in Table 2. An increasing number of vacancies are observed for general surgery, orthopedic surgery, and obstetrics and gynecology, whereas a decline in the number of vacancies is seen for anesthesia and diagnostic radiology.

Discussion

Review of the recent CaRMS data reveals a concerning decline in first-choice applicants to surgical specialties. In fact, in recent years there have been fewer first-choice applicants to general surgery than available residency positions across Canada. In contrast, several other specialties have become more attractive to graduates, with radiology and anesthesia experiencing the sharpest increase in applicants. Several explanations for the observed trends have been suggested, including graduates placing greater emphasis on a favorable lifestyle. A similar trend has been recognized in the United States, with a decline in the selection of noncontrollable lifestyle specialties and an increasing enrollment in controllable lifestyle specialties among the top 15% of medical students [4, 5].

Several factors related to lifestyle may be contributing to the declining popularity of general surgery: poor recruitment strategies, duration of surgical training, comparatively low remuneration, and a changing medical student population. A recent survey of residents from the University of Kansas supports the finding that many

of these factors contribute to career selection, finding that length of residency, desirable lifestyle, working hours, and financial obligations affect the choice of specialty [6].

Developing positive relationships with medical students is crucial to their subsequent recruitment; yet students on surgical rotations are often assigned the more menial, less interesting tasks of the surgical team, ultimately leaving the students with a negative surgical experience. The importance of relationships is illustrated by the surgery program at the University of Western Ontario, where a strong surgical presence during the early years of medical school and surgical mentorships have resulted in a consistent 10% of the graduating class pursuing general surgery as a career, a figure significantly higher than the national 4.25% in 2001. The importance of developing positive relationships with medical students has also been emphasized in recent studies, as early exposure to positive role models is strongly associated with medical students' choice of clinical field for their residency training [7, 8].

Another potential deterrent to pursuing a career in surgery is the length of training. A 5- or 6-year residency in itself may be a disincentive, with subsequent subspecialization frequently further lengthening their training. At a time when the average age of graduating medical students is increasing, the desire to enter long residencies is undoubtedly becoming less attractive; and as surgical educators push to increase the length of surgical training in Canada, a further decline in the popularity of general surgery can be anticipated [9, 10].

With general surgery being one of the lowest paid surgical specialties in Canada, poor monetary remuneration may also be a deterrent [11]. Over the past few years, increasing financial pressures have forced medical students to give greater consideration to this issue, a concern unlikely to change in the near future as tuition rates at Canadian medical schools continue to rise.

Another issue to consider is the possibility that there has been a change in the attitude of candidates entering medical school. As medical schools increasingly recruit well rounded individuals with multiple extracurricular interests, it logically follows that upon graduation specialty training conducive to maintaining a balanced lifestyle is a prominent factor. The change in the medical student population is also reflected by an increase in women. In 1970 only 10% of students admitted to Canadian medical schools were

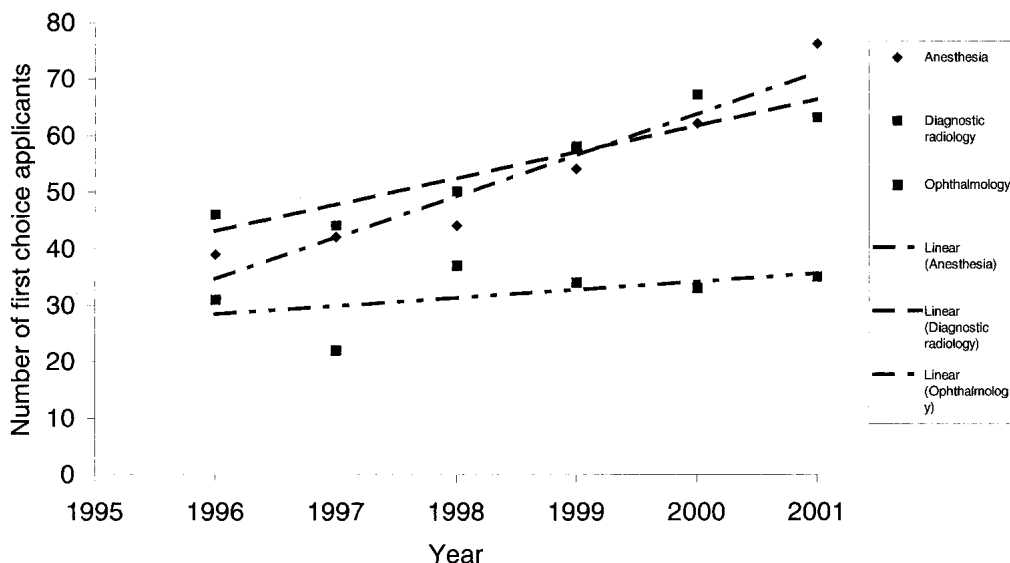


Fig. 2. Number of first-choice applicants to anesthesia, diagnostic radiology, and ophthalmology through the CaRMS match from 1996 to 2001.

Table 2. Vacant residency positions after the first round of the CaRMS match.

Specialty	Vacancies					
	1996	1997	1998	1999	2000	2001
Anesthesia	14	13	13	3	0	0
Diagnostic radiology	7	2	2	0	0	0
General surgery	0	0	0	6	4	4
Obstetrics and gynecology	1	5	5	12	1	9
Ophthalmology	0	0	0	0	0	0
Orthopedic surgery	0	0	0	0	0	8

CaRMS: Canadian Residency Matching Service.

women. This percentage then steadily increased and leveled off in 1996, with women constituting approximately 50% of the current enrollment [12]. Yet women account for only 10% of practicing general surgeons in Canada [13]. The situation is similar in the United States, where more than 40% of first year medical students are women but they comprise fewer than 20% of students entering surgical residencies [14, 15]. In addition to being less likely to pursue surgical careers, women are less likely to complete surgical residencies, with lifestyle considerations cited as the major factor for their withdrawal [16, 17]. However, a study from the University of California found that women can be attracted to surgery if some basic characteristics of the residency program are present, including strong leadership, good clinical experience, and high resident morale [15].

The decline in popularity of general surgery has not been universal, with applications to surgery remaining stable or increasing in areas of Southeast Asia, South America, and the Middle East [18–20]. Despite the present stability of surgical applicants abroad, monitoring international trends may be useful for determining whether the current decline in popularity of surgery in North America heralds a global change. Literature pertaining to the experience in countries where restrictions on physician work hours have been implemented was not available for our study but would be valuable to review, as lifestyle should play at least a minor role in career selection. In any event, changes in surgical training and practice may be necessary to reverse the current trend in North America

and once again attract the best and the brightest to the field of surgery.

Résumé. Récemment, on s'est rendu compte que moins d'étudiants en médecine choisissaient une carrière en chirurgie générale. Pour confirmer cette hypothèse, on a analysé la banque de données du Canadian Residency Matching Service (CaRMS) entre 1996 et 2001 pour déterminer les tendances récentes dans le choix de carrière fait par les étudiants. Trois spécialités chirurgicales comprenant la chirurgie générale, la chirurgie orthopédique, et la gynécologie obstétrique ont été choisies comme comportant un «mauvais» style de vie, par rapport à l'anesthésie, à la radiologie diagnostique et à l'ophtalmologie, comportant un «bon» style de vie. Par une régression linéaire et un calcul du Chi carré, on a identifié les changements principaux dans le choix parmi les étudiants de chaque spécialité. Parmi les premiers choix, on a observé une tendance négative pour les trois spécialités comportant un «mauvais» style de vie, alors que le choix des spécialités à «bon» style de vie a augmenté. Les facteurs potentiels qui influencent la sélection des étudiants en médecine sont discutés, en soulignant la réduction du nombre de ceux qui choisissent la chirurgie générale en premier.

Resumen. Existe la percepción de que menos estudiantes de medicina aspiran a hacer su carrera en cirugía general. Con el propósito de validar tal premisa, se efectuó una revisión de las bases de datos de Canadian Residency Matching Service (CaRM) entre 1996 y 2001 para identificar las tendencias recientes de selección de carrera por parte de los graduandos. Las especialidades quirúrgicas, incluyendo cirugía general, cirugía ortopédica y obstetricia & ginecología fueron escogidas para el análisis como especialidades de “pobre estilo de vida” y comparadas con anestesia, radiología diagnóstica y oftalmología, como representativas de “buen estilo de vida.” Los análisis estadísticos de regresión lineal y chi cuadrado fueron utilizados para identificar cambios significativos en los aspirantes a cada especialidad. Se observó una tendencia negativa en las escogencias de primer orden en las tres especialidades de “pobre estilo de vida,” en tanto que las tres especialidades de “buen estilo de vida” mostraron un incremento en la escogencia de primer orden. Se discuten los factores potenciales que influyen sobre la escogencia de las residencias por parte de los estudiantes, haciendo énfasis en la disminución de la cirugía general como escogencia de primer orden.

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References

1. Podnos YD, Campbell B, Wilson SE, et al. Patterns of graduating medical student career selections from 1993 to 1998 and their effect on surgery as a career choice. *Arch. Surg.* 1999;134:876–880
2. Cofer JB, Biderman MD, Lewis PL, et al. Is the quality of surgical residency applicants deteriorating? *Am. J. Surg.* 2001;181:44–49
3. Canadian Residency Matching Service. Statistics from the Match 1996–2001, Ottawa, http://www.carms.ca/stats/stats_index.htm
4. Schwartz RW, Jarecky RK, Strodel WE, et al. Controllable lifestyle: a new factor in career choice by medical students. *Acad. Med.* 1989;64:606–609
5. Schwartz RW, Simpson WG, Strodel WE, et al. Career change: in quest of a controllable lifestyle. *J. Surg. Res.* 1989;47:189–192
6. Woodworth PA, Chang FC, Helmer SD. Debt and other influences on career choices among surgical and primary care residents in a community-based hospital system. *Am. J. Surg.* 2000;180:570–575
7. Erzurum VZ, Obermeyer RJ, Fecher A, et al. What influences medical students' choice of surgical careers. *Surgery* 2000;128:253–256
8. Wright S, Wong A, Newill C. The impact of role models on medical students. *J. Gen. Intern. Med.* 1997;12(1):76–77
9. At a Glance. Class of '96 has age on its side. *Can. Med. Assoc. J.* 1996;155:1722
10. Wedge JH, Hamilton SM, Taylor BR. Residency education in surgery. *Can. J. Surg.* 2001;44:327–329
11. Canadian Institute for Health Information (CIHI). Average Payment Per Physician Report Canada, 1993/94 to 1995/96, Ottawa, National Physician Database, 1999;38
12. Canadian Medical Education Statistics: Graduates of Canadian Medical Schools by Gender, Association of Canadian Medical Colleges, Ottawa, 2000
13. CMA Masterfile, Specialists in Canada by Age, Sex and Province, Ottawa, Canadian Medical Association, 2001
14. Lillemoe KD, Ahrendt GM, Yeo CJ, et al. Surgery—still an “old boys’ club”? *Surgery* 1994;116:255–259
15. Mayer KL, Perez RV, Ho HS. Factors affecting choice of surgical residency training programs. *J. Surg. Res.* 2001;98:71–75
16. Bergen PC, Turnage RH, Carrico CJ. Gender-related attrition in a general surgery training program. *J. Surg. Res.* 1998;77:59–62
17. Aufses AH Jr, Slater GI, Hollier LH. The nature and fate of categorical surgical residents who “drop out.” *Am. J. Surg.* 1998;175:236–239
18. Firueiredo JF, Rodrigues MdeL, Troncon LE, et al. Influence of gender on specialty choices in a Brazilian medical school. *Acad. Med.* 1997;72:68–70
19. Al-Faris E, Kalanthan K, al-Rowais N, et al. Career choice among medical students. *Acad. Med.* 1997;72:65–67
20. Zulkifli A, Rogayah J. Career preferences of male and female medical students in Malaysia. *Med. J. Malaysia* 1997;52:76–81