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Are Canadian general surgery residents ready for the 80-hour work week? A nationwide survey

Monisha Sudarshan, MD*
Wael C. Hanna, MD, MBA*
Mohammed H. Jamal, MD*
Lily H.P. Nguyen, MD†
Shannon A. Fraser, MD, MSc*

From the *Department of General Surgery and the †Department of Otolaryngology, McGill University, Montréal, Que.

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Correspondence to:
Dr. S.A. Fraser
3755 Côte St. Catherine
Pavilion A-510
Montréal QC H3T 1E2
shannon.fraser@mcgill.ca

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Background: The purpose of this study was to describe Canadian general surgery residents' perceptions regarding potential implementation of work-hour restrictions.

Methods: An ethics review board-approved, Web-based survey was submitted to all Canadian general surgery residency programs between April and July 2009. Questions evaluated the perceived effects of an 80-hour work week on length of training, operative exposure, learning and lifestyle. We used the Fisher exact test to compare senior and junior residents' responses.

Results: Of 360 residents, 158 responded (70 seniors and 88 juniors). Among them, 79% reported working 75–100 hours per week. About 74% of seniors believed that limiting their work hours would decrease their operative exposure; 43% of juniors agreed ($p < 0.001$). Both seniors and juniors thought limiting their work hours would improve their lifestyle (86% v. 96%, $p = 0.12$). Overall, 60% of residents did not believe limiting work hours would extend the length of their training. Regarding 24-hour call, 60% of juniors thought it was hazardous to their health; 30% of seniors agreed ($p = 0.001$). Both senior and junior residents thought abolishing 24-hour call would decrease their operative exposure (84% v. 70%, $p = 0.21$). Overall, 31% of residents supported abolishing 24-hour call. About 47% of residents (41% seniors, 51% juniors, $p = 0.26$) agreed with the adoption of the 80-hour work week.

Conclusion: There is a training-level based dichotomy of opinion among general surgery residents in Canada regarding the perceived effects of work hour restrictions. Both groups have voted against abolishing 24-hour call, and neither group strongly supports the implementation of the 80-hour work week.

Contexte : Cette étude visait à décrire les perceptions des résidents en chirurgie générale du Canada au sujet de restrictions possibles des heures de travail.

Méthodes : Un sondage web approuvé par un conseil d'examen de l'éthique a été présenté à tous les programmes canadiens de résidence en chirurgie générale entre avril et juillet 2009. Les questions évaluaient les effets perçus d'une semaine de travail de 80 heures sur la durée de la formation, l'exposition au milieu opératoire, l'apprentissage et les habitudes de vie. Nous avons utilisé le test exact de Fisher pour comparer les réponses des médecins résidents seniors et celles de leurs collègues débutants.

Résultats : Sur 360 médecins résidents, 158 ont répondu (70 seniors et 88 débutants), et 79 % d'entre eux ont déclaré travailler de 75 à 100 heures par semaine. Environ 74 % des médecins résidents seniors croyaient que la limitation de leurs heures de travail réduirait leur exposition au milieu opératoire; 43 % des médecins résidents débutants étaient d'accord avec eux ($p < 0,001$). Les médecins résidents seniors et leurs collègues débutants croyaient que la limitation de leurs heures de travail améliorerait leurs habitudes de vie (86 % c. 96 %, $p = 0,12$). Dans l'ensemble, 60 % des médecins résidents ne croyaient pas que la limitation des heures de travail prolongerait la durée de leur formation. En ce qui concerne les périodes de garde de 24 heures, 60 % des médecins résidents débutants croyaient qu'elles étaient dangereuses pour leur santé et 30 % des médecins résidents seniors étaient d'accord avec eux ($p = 0,001$). Les médecins résidents seniors et leurs collègues débutants croyaient que l'abolition des périodes de garde de 24 heures réduirait leur exposition au milieu opératoire (84 % c. 70 %, $p = 0,21$). Dans l'ensemble, 31 % des médecins résidents appuyaient l'abolition des périodes de garde de 24 heures. Environ 47 % des médecins résidents (41 % seniors, 51 % débutants, $p = 0,26$) étaient d'accord pour qu'on adopte la semaine de travail de 80 heures.

Conclusion : Il existe chez les résidents en chirurgie générale au Canada une dichotomie d'opinion basée sur la formation en ce qui concerne les effets perçus des limitations des heures de travail. Les 2 groupes ont voté contre l'abolition des périodes de garde de 24 heures et aucun des 2 groupes n'appuie fermement la semaine de travail de 80 heures.

The enforcement of resident work-hour limitations in the United States in July 2003 led to a dramatic change in the culture and organization of several general surgery programs. Propagated primarily owing to concerns over patient safety while in the hands of fatigued residents,¹⁻³ the limitations continue to produce much controversy.^{4,5} Serious apprehension exists about the adequacy of training and experience of the next cohort of general surgeons.⁶ Furthermore, conclusive data on improved patient outcomes after these restrictions are pending.^{7,8} Many studies indicate that medical errors caused by resident fatigue may now be replaced by increased communication gaps and decreased continuity of care.⁹⁻¹² To revamp residency programs and health care systems to comply with these restrictions, substantial resources have been invested, including implementation of the night float system and recruitment of additional non-physician personnel to compensate for loss of resident hours.¹³⁻¹⁵

Currently in Canada there are no national work-hour restrictions for residents in place; however, serious deliberations regarding work hours are progressing at the national and provincial levels within residency education committees and resident organizations. Critical analysis of patient outcomes, resident operative volume and impact on the health care system is warranted when structuring this protocol. Yet, there is a paucity of data on whether these restrictions will be accepted by residents and how the necessary adaptations required will influence the residency programs and health care system. A recent survey of U.S. surgical residents showed 41% believed work-hour restrictions were an important barrier to their education, with 44% stating a work week of 80–100 hours as ideal.¹⁶

The purpose of our study was to survey Canadian general surgery residents regarding their perception toward enforcement of work-hour restrictions and the night float system.

METHODS

After ethics board approval and endorsement by the Canadian Association of General Surgeons Residency Education Committee, we sent out a 27-question web-based survey to all general surgery residents across Canada. All programs except 1 actively participated in the survey. Questions were formulated about the perceived potential effects of work-hour restrictions on the length of training, level of operative exposure, learning and lifestyle of residents. Questions were answered on a 5-point Likert scale (1 = strongly agree, 5 = strongly disagree). Responses from senior residents (postgraduate year [PGY]4–5) were compared with those of junior residents (PGY1–3). We used the Fisher 2-tailed exact test to determine significance; we considered results to be significant at $p < 0.05$.

RESULTS

Complete responses were available from 158 (seniors = 70, juniors = 88) of 360 general surgery residents across Canada, for a response rate of 44%. Male and female residents were represented equally (50%). Ninety-five percent of residents reported being satisfied with their choice of general surgery; however, 32% considered switching disciplines, and lifestyle was stated as the most common inciting factor (80%).

Most residents (79%) stated they worked an average of 75–100 hours per week, and 15% stated that they worked an average of more than 100 hours per week. Most residents (74%) agreed their current work hours were required to achieve adequate operative exposure. Should an 80-hour work-week limitation be implemented, 74% of seniors and 43% of juniors believed that it would decrease their operative experience (Table 1). Sixty-nine percent of junior residents believed that such a limitation would attract and retain more residents; 42% of seniors agreed ($p < 0.001$). Seniors also felt more strongly than juniors that a work-hour

Table 1. Canadian surgical residents' opinion regarding the 80-hour work week

Statement	Group; % agreement			p value
	All, n = 158	Seniors, n = 70	Juniors, n = 88	
80-hr wk limitation decreases operative experience	61	74	43	< 0.001
80-hr wk limitation decreases learning experience	47	50	53	0.73
80-hr wk improves lifestyle	88	86	96	0.12
80-hr wk attracts and retains more residents	64	42	69	< 0.001
80-hr wk prevents from completing Royal College requirements within 5 years	43	52	40	0.05
80-hr wk will extend residency 7 years	38	38	30	< 0.001
7-yr residency would have dissuaded me (the participant) from applying to general surgery	88	95	91	0.13
7-yr residency will dissuade residency from applying to fellowships	80	95	92	0.63
Agree with enforcement of the 80-hr wk in Canada	47	41	51	0.26

restriction would prevent completion of the Royal College of Physicians and Surgeons of Canada objectives of training (52% v. 40%, $p = 0.05$) and could extend residency to a 7-year program (38% v. 30%, $p < 0.001$). Both groups agreed that a 7-year residency would deter applications to general surgery and discourage current residents from pursuing fellowships (88% and 80%, respectively). Overall, general surgery residents were almost evenly split on wanting the 80-hour work week implemented (47% for implementation), with no significant differences between the seniors and juniors (41% of seniors v. 51% of juniors, $p = 0.26$).

Regarding the 24-hour call policy (Table 2), juniors believed more strongly than seniors that it was hazardous to their health (60% juniors v. 30% seniors, $p < 0.001$) and to the health of their patients (54% v. 35%, $p = 0.05$). However, both groups agreed that establishing shift work may not be easily feasible in their program (only 36% believed a night float system would be feasible) and would decrease operative experience (72%). Regarding the abolishment of 24-hour call and its replacement by a night float system, seniors were less in favour than juniors (22% v. 42%, $p = 0.007$).

DISCUSSION

We recognize that a limitation of this survey is a response rate of 44%, which may be attributed to the inherent restrictions of an Internet survey, lack of adequate time for residents to participate in a voluntary research survey or insufficient interest in residency education. Yet, the results of our survey reveal several important perceptions regarding work-hour restrictions among Canadian general surgery residents. First, since most residents (nearly 80%) worked 75–100 hours per week, with 15% of residents working more than 100 hours per week, instituting an 80-hour work week would demand a substantial adjustment of resident training schedules. However, residents across the country remain divided on work-hour restriction (47% overall supported the implementation of an 80-hour work week), with no significant difference of opinion

between seniors and juniors. A major issue with work-hour restriction for surgical residents is the potential sacrifice of operative caseload and learning experience. In addition, a decrease in operative exposure may have major repercussions for the quality of future surgical care. Our study findings are consistent with those of several other studies revealing apprehension among senior compared with junior residents in surgery, regarding adequate operative exposure.^{17–21} This anxiety may be explained by the greater percentage of time seniors spend in the operating room than juniors trying to master operative skills as they approach their transition to independent practice. Among senior residents in Canada, 74% believed work-hour restrictions would decrease their operative time, and as many as 52% thought that such restrictions would affect the core knowledge required to achieve Royal College objectives of training and that they would be unable to fulfill their Royal College requirements. This perception is supported by a study by Kairys and colleagues,¹⁸ who found an 8.3% decrease in chief resident caseload after implementation of work-hour limitations. Teaching assistant (TA) cases (wherein a senior resident guides a junior resident through a case) are considered an important opportunity for honing skills in technique, intraoperative decision-making and the development of teaching skills. However, several studies have demonstrated a consistent, worrisome decline of 42%–78% in TA caseload after implementation of work-hour restrictions.^{19–21} Studies have also indicated a decline in first assistant cases for juniors (an essential operative foundation) of up to 81%.⁴ One study hypothesized that senior residents in their program maintained adequate operative load by taking over junior resident cases.²²

As surgical residents strive to spend as much time as possible in the operating room owing to perceived caseload deficits resulting from work-hour restrictions, learning activities outside the operating room, such as clinics, consults and bedside teaching are likely to be detrimentally affected as well. A recent survey of program directors in the United States reported a 68% reduction in bedside

Table 2. Canadian surgical residents' opinion regarding 24-hour call

Statement	Group; % agreement			<i>p</i> value
	All, <i>n</i> = 158	Seniors, <i>n</i> = 70	Juniors, <i>n</i> = 88	
24-hr call is hazardous to your health	52	30	60	< 0.001
24-hr call is hazardous to the health of your patients	43	35	54	0.05
Establishing a night float system is practically feasible in your program	36	32	29	0.86
Abolishing 24-hr call decreases learning experience	64	74	46	0.004
Abolishing 24-hr call decreases operative experience	72	84	70	0.22
Abolishing 24-hr call will improve lifestyle	71	64	84	0.08
Abolishing 24-hr call will attract and retain more residents	53	44	58	0.005
Do you agree with abolishing 24-hr call	31	22	42	0.007

teaching to comply with work-hour limits.²³ Another study noted a significant decrease in outpatient clinic consultations for residents.²⁴

Given the declining interest in general surgery residency among medical students,²⁵ 69% of juniors (in contrast to 42% of seniors, $p < 0.001$) believe an 80-hour work week may attract and retain more residents in the specialty. More juniors than seniors also believe that a night float system would attract more applicants (58% v. 44%, $p = 0.005$). Certainly, the demanding and unpredictable lifestyle of general surgery is a deterrent stated by many medical students;²⁶ however, studies indicate other important factors, such as personality, future income, educational debt, sex and role models, can play equally critical roles.²⁷⁻²⁹

To compensate for loss of educational experience owing to work-hour restrictions, the idea of extending the general surgery residency to 7 years has been raised. Clearly many inherent disadvantages of this strategy will impact the number of applicants to general surgery and result in important ramifications for subspecialization. Thirty-eight percent of seniors and 30% of juniors ($p < 0.001$) were concerned about such an increase in the length of their training. Both groups strongly agreed that such an extension would dissuade people from applying to the specialty (88%) and affect the decision of current general surgery residents to pursue fellowships (80%).

Work-hour limitations were initially brought to the attention of the public as a result of medical errors being attributed to physician fatigue.¹⁻³ When surveyed about 24-hour call, a minority of senior residents believed that it is hazardous to their health (seniors 30% v. juniors 60%, $p < 0.001$) and the health of their patients (seniors 35% v. juniors 54%, $p = 0.05$). Only a few studies have demonstrated an improvement in patient care after the implementation of work-hour restrictions in surgical specialties.^{30,31} Specifically, a recent large retrospective trial demonstrated a significant decrease in 30-day mortality from 1.96% to 1.10% after work-hour changes.³² Cautious interpretation of this study is required, as several modifications were made within this institution, including increased staff recruitment and increased direct patient care by attending surgeons. Conversely, several studies have demonstrated an increase in complication rates and readmission rates on surgical wards after implementation of work-hour restrictions.^{33,34} Poor communication, incomplete sign-over and decreased resident involvement in patient care were cited as primary factors.

Establishment of a night float system requires substantial restructuring within a residency program, with only 36% of residents in our study believing it is practically feasible in their program. Given that the night float system is viewed as a quiet rotation, most residents in both groups (72%) believed such a system would decrease their operative experience, with 64% of all residents also stating that overall learning experience would be reduced owing to

exclusion from daytime activities. This is demonstrated in a study by Kelly and colleagues.¹⁷ Senior residents' average caseload on the night float system decreased to 224 cases per year compared with 276 cases per year on day rotations ($p < 0.05$). Furthermore, another institutional study revealed that when the call system transitioned back to rotating 24-hour call from night float (owing to immense dissatisfaction), residents reported increased learning opportunities from staff, more accountability for patients and generally better morale.³⁵ Given these reservations, only 22% of seniors and 42% of juniors in our study supported establishing a night float system within their program ($p = 0.007$). Interestingly, an outcome study by Bollschweiler and colleagues³⁶ on the impact of 12-hour shifts versus 8-hour shifts in the intensive care unit reported lengthier stays in hospital for patients and increased complication rates for 8-hour shifts. The authors stated that addressing the development of a "shift mentality" and lack of patient ownership with such changes have been important to maintain professionalism.^{37,38}

CONCLUSION

Work-hour limitations have created considerable controversy and concern within surgery residency programs for both staff and residents. As discussions about work-hour limitations in Canada continue, we believe that it is important that the opinions of residents factor heavily into an evidence-based decision. In our survey, neither senior nor junior residents pronounced themselves for or against the implementation of the 80-hour work week. However, replacing the 24-hour call with a night float system was largely disfavoured by residents in our survey owing to concern about operative exposure and learning opportunities.

Competing interests: None declared.

Contributors: W.C. Hanna, L.H.P. Nguyen and S.A. Fraser designed the study. S.A. Fraser acquired the data, which M. Sudarshan, W.C. Hanna, M.H. Jamal and S.A. Fraser analyzed. M. Sudarshan and W.C. Hanna wrote the article, which M.H. Jamal, L.H.P. Nguyen and S.A. Fraser reviewed. All authors approved its publication.

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