Canadian Plastic Surgery Resident Work Hour Restrictions: Practices and Perceptions of Residents and Program Directors

Plastic Surgery

2018, Vol. 26(1) 11-17

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DOI: 10.1177/2292550317749512

journals.sagepub.com/home/psg

La restriction des heures de travail des résidents canadiens en chirurgie plastique : les pratiques et les perceptions des résidents et des directeurs de programme

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Abstract

Background: The impact of resident work hour restrictions on training and patient care remains a highly controversial topic, and to date, there lacks a formal assessment as it pertains to Canadian plastic surgery residents. **Objective:** To characterize the work hour profile of Canadian plastic surgery residents and assess the perspectives of residents and program directors regarding work hour restrictions related to surgical competency, resident wellness, and patient safety. **Methods:** An anonymous online survey developed by the authors was sent to all Canadian plastic surgery residents and program directors. Basic summary statistics were calculated. **Results:** Eighty (53%) residents and 10 (77%) program directors responded. Residents reported working an average of 73 hours in hospital per week with 8 call shifts per month and sleep 4.7 hours/night while on call. Most residents (88%) reported averaging 0 post-call days off per month and 61% will work post-call without any sleep. The majority want the option of working post-call (63%) and oppose an 80-hour weekly maximum (77%). Surgical and medical errors attributed to post-call fatigue were self-reported by 26% and 49% of residents, respectively. Residents and program directors expressed concern about the ability to master surgical skills without working post-call. **Conclusions:** The majority of respondents oppose duty hour restrictions. The reason is likely multifactorial, including the desire of residents to meet perceived expectations and to master their surgical skills while supervised. If duty hour restrictions are aggressively implemented, many respondents feel that an increased duration of training may be necessary.

Résumé

Historique : L'effet des restrictions des heures de travail des résidents sur la formation et les soins aux patients est un sujet très controversé. Jusqu'à présent, il n'y a pas d'évaluations officielles de cette réalité chez les résidents canadiens en chirurgie plastique. **Objectif :** Caractériser le profil des heures de travail des résidents canadiens en chirurgie plastique et évaluer les points de vue des résidents et des directeurs de programme à l'égard de l'effet des restrictions des heures de travail sur la compétence chirurgicale, le bien-être des résidents et la sécurité des patients. **Méthodologie :** Les auteurs ont préparé un sondage anonyme en ligne qu'ils ont transmis à tous les résidents et les directeurs de programme en chirurgie plastique au Canada. Ils ont synthétisé les statistiques de base. **Résultats :** Au total, 80 résidents (53 %) et dix directeurs de programme (77 %) ont répondu au sondage. Les résidents ont déclaré faire une moyenne de 73 heures de travail hospitalier par semaine, faire huit quarts de garde par mois et dormir 4,7 heures par nuit lorsqu'ils sont sur appel. La plupart d'entre eux (88 %) déclarent une moyenne de 0 journée de congé

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après une garde, et 61 % travaillent ensuite sans avoir dormi. La majorité désire pouvoir travailler après une garde (63 %) et s'oppose à un maximum hebdomadaire de 80 heures (77 %). Par ailleurs, 26 % des résidents précisent avoir fait des erreurs chirurgicales et 49 %, des erreurs médicales qu'ils attribuent à la fatigue accumulée après une garde. Les résidents et les directeurs de programme s'inquiètent de la capacité des résidents à maîtriser les habiletés chirurgicales s'ils ne travaillent pas après les gardes. **Conclusions :** La majorité des répondants s'opposent aux restrictions des heures de garde. La raison est probablement multifactorielle, y compris le fait que les résidents souhaitent répondre aux attentes perçues et maîtriser leurs habiletés chirurgicales pendant qu'ils sont sous supervision. Si les restrictions des heures de garde étaient vigoureusement adoptées, de nombreux répondants croient qu'il faudrait allonger la formation.

Keywords

plastic surgery, education, resident, work hour restriction

Introduction

The topic of resident work hour restrictions has been at the forefront of medical education for several decades and remains highly controversial and complex. At the heart of this issue lies patient safety, and at first glance, it appears intuitive that a tired physician will make more errors and place patients at higher risk of adverse events than a rested physician.¹ However, when this theme is explored in-depth, difficult questions arise that challenge this assumption. Resident work hour restrictions may result in increased patient handovers, potentially increasing miscommunication of critical patient information. Residents may graduate with fewer operative experiences and may not have trained to work safely while coping with fatigue. Studies have shown inconsistent results when examining the impact of work hour restrictions on resident wellness, education, and development of technical skills, further adding to the complexity of this debate.²⁻⁷

Several different models of work hour restrictions have been adopted across North America over the past 15 years in an attempt to improve patient safety and resident well-being. The changes set in place by the Accreditation Council for Graduate Medical Education (ACGME) in 2003 that instituted an 80-hour workweek restriction for all residents in the United States have sparked debate on guidelines within Canada.^{8,9} In 2011, the ACGME expanded these restrictions and instituted a 16-hour maximum shift for first-year residents and a 24-hour maximum for second-year residents and above, while policies for Canadian residents have remained largely provincially determined and not strictly enforced.^{8,9} Official restrictions in total hours worked per week currently only exist in Manitoba (89 hours), the Maritimes (90 hours), and Québec (72 hours). Post-call restrictions vary significantly by province and depend on numerous factors including in-house versus home call, shift work, and being encouraged versus mandated.¹⁰⁻¹⁶

Despite the implementation of resident work hour restrictions in the United States, there is evidence that they haven't resulted in improved patient care and safety.^{6,7} An investigation conducted following the 2011 ACGME regulations showed no significant difference in surgical outcomes in the periods following the implementation of the work hour limitations.¹⁷ Moreover, a recent national randomized trial entitled, "National cluster-randomized trial of duty-hour flexibility in surgical training" by Bilimoria et al of 4330 American general surgery residents

showed that flexible duty hour restrictions were equally safe for patients and aided resident skill acquisition although at the cost of decreased resident well-being outside of the hospital.⁷ These findings were measured in the 30-day post-operative period with data from the American College of Surgeons National Surgical Quality Improvement Program.⁷ Additional studies also show similarities in surgical resident case logs and education before and after the implementation of the 2011 ACGME guidelines, although there is evidence of underreporting and noncompliance by surgical residents who wish to work post-call.¹⁸⁻²² Advancement of technical surgical skills and the adequacy of preparation of residents for independent practice remain unclear; a recent systematic review suggests there is a perceived negative impact on surgical skills.^{5,23,24} Although there doesn't appear to be a clear benefit on surgical outcomes, a slight increase in resident wellness and quality of life has been observed following implementation of the 2011 ACGME restrictions.⁵ Following a thorough assessment of the available evidence pertaining to patient safety, the ACGME has, as per July 1, 2017, *increased* the number of consecutive work hours permitted for first-year residents to 24 hours (from 16 as per the 2011 guidelines).²⁵

While there is a rapidly expanding bank of literature describing the resident experience, there remains very little published pertaining specifically to plastic surgery. Recently, Drolet et al demonstrated that plastic surgery residents found home call offers a fair compromise within the framework of work hour restrictions to provide residents with the necessary educational and clinical experiences.²⁶ A 2004 report surveyed 12 residents at their institution 6 months after implementation of the 2003 guidelines and found the limitations to be favorable to resident well-being but with an uncertain impact on operative experiences.²⁷ Finally, a larger study evaluating several surgical specialties found that there was no change in plastic surgery resident caseloads following the implementation of the 2003 guidelines, although the reason for this is unclear and may be due to residents substituting longer procedures with shorter, less complex ones.²⁸ For most Canadian plastic surgery training programs, call is considered home call unless certain criteria are met such that it is converted to in-house call. Official post-call restrictions for Canadian plastic surgery residency programs are listed by province (Table 1).

Table 1. Provincial Post-Call Work Hour Restrictions Among Canadian Plastic Surgery Training Programs.

Province	Restriction
British Columbia	If less than 4 hours of sleep while on call, the resident has the option of going home post-call ¹²
Alberta	If a resident goes to the hospital between midnight and 06:00, they have option of going home post-call ¹³
Manitoba	If a resident works 4 hours on call, with 1 being past midnight, option of going home the next day ¹⁴
Ontario	If a resident works 4 hours on call, with 1 being past midnight, the resident shall be relieved of duties by 12:00 the next day ¹⁶
Quebec	If a resident works 18/24 hours, they must go home post-call and cannot work more than 24 hours in a row ¹¹
Nova Scotia	If a resident goes to the hospital between midnight and 06:00, they have option of going home post-call (can participate in exceptional educational experiences post-call) ¹⁵

At present, no studies have specifically assessed the work hour profile of Canadian plastic surgery residents and their perception on work hour restrictions as they pertain to training, patient care, and quality of life. These perspectives, and those of their program directors, will be evaluated in the following study.

Methods

The authors developed an anonymous online questionnaire that included questions on basic demographics, current working hours, and opinions/perceptions of work hour restrictions as they pertain to patient safety, education, and resident well-being. Many questions were novel; however, others were based off previous studies.^{8,29-31}

Human research ethics board approval from the University of Manitoba was obtained. E-mail invitations were sent 3 times to all 151 Canadian plastic surgery residents and the program directors of all 13 Canadian plastic surgery residency programs in 2012. No financial or other incentives were provided to encourage participation. Responses were collected and analyzed using basic summary statistics with SPSS software.

Results

Participant Demographics

The survey received responses from 80 (53%) of the 151 Canadian plastic surgery residents and from 10 (77%) of the 13 program directors. Of the resident respondents, 52% were male and 42% were female. Fifty-one percent of the residents responding were single and 49% were married, with nearly equal responses across all 5 years of post-graduate medical training (Table 2).

Resident Call Responsibilities

Canadian plastic surgery residents reported working on average 73 hours per week (ranging from 40 to 110 hours), with a mean

Table 2. Demographic Profile of Resident Respondents.

Resident Demographics		
	n	%
Total responses		
Residents	80	53
Program directors	10	77
Gender		
Male	41	51
Female	39	49
Marital status		
Single	41	51
Married	39	49
Year of training		
PGY-1	11	14
PGY-2	15	19
PGY-3	19	24
PGY-4	21	26
PGY-5	14	18

Abbreviations: PGY-1, Post Graduate Year 1; PGY-2, Post Graduate Year 2; PGY-3, Post Graduate Year 3; PGY-4, Post Graduate Year 4; PGY-5, Post Graduate Year 5.

Table 3. Work Hour Profile of Canadian Plastic Surgery Residents.

Work Hour Profile	
Hours worked per week	
Average	73
Range	40-110
Call type	
Home call	99%
In-house call	1%
Call shifts per month	
Average	8
Ratio	1 in 3.8
Amount of sleep while on call	
Average	4.7 hours

8 call shifts per month. Essentially all residents (99%) report utilizing a home-call system in their program, such that they don't need to come into hospital at night unless required to operate or manage ward and emergency department patients. Residents averaged 4.7 hours of sleep per night while on call (Table 3). Assessment of post-call days taken off monthly reveals that, on average, 88% of Canadian plastic surgery residents do not take any post-call days off, 9% take 1 post-call day, 2% take 2 post-call days, and 1% take greater than 3 post-call days off (Table 4). Additionally, 61% of residents reported they will never take a post-call day off even if they have not slept, and 99% stated that they will work post-call if they've had at least 4 hours of sleep.

Perceptions of Work Hour Restrictions

Resident responses indicate that 73% feel taking post-call days off is optional, 5% feel they are mandatory, and 22%

Table 4. Resident Post-Call Days Off Per Month.

Post-Call Days Taken Off Per Month		
	n	%
Days/month		
0	70	88
1	7	9
2	2	2
>3	1	1
Minimum hours of sleep required to work post-call		
0 hours	48	61
>1 hour	4	5
>2-4 hours	26	33
>5 hours	1	1

Table 5. Perceptions of Work Hour Restrictions Among Canadian Plastic Surgery Residents.

Perceptions of Work Hour Restrictions				
	Residents		Program Directors	
	n	%	n	%
Resident post-call days off are				
Optional	58	73	8	80
Mandatory	18	22	2	20
Not Permitted	4	5	0	0
Prefer post-call days off are				
Optional	50	63	-	-
Mandatory	30	37	-	-
Prefer 80-hour workweek limit				
Yes	25	31	3	30
No	55	69	7	70
If 80-hour/week limit, extend residency by				
0 months	47	63	2	20
6 months	18	24	1	10
12 months	10	13	7	70
6-year residency would discourage application to fellowship				
Yes	37	46	1	10
No	43	54	9	90
Pressure from staff to work post-call				
Agree	45	56	0	0
Uncertain	9	11	1	10
Disagree	26	33	9	90
Pressure from residents to work post-call				
Agree	42	53	-	-
Uncertain	8	10	-	-
Disagree	29	37	-	-
Need to work post-call to master surgical skills				
Agree	42	53	8	80
Uncertain	18	23	0	0
Disagree	19	24	2	20

state that they are not permitted to take them off (Table 5). Among program directors, 80% said their residents had the option of working post-call, whereas 20% stated that they were mandated to take them off. The majority (63%) of residents prefer having the option of working post-call, whereas

Table 6. Perception of Resident Errors Due to Post-Call Fatigue.

Perception of Resident Errors Due to Post-Call Fatigue				
	Residents		Program Directors	
	n	%	n	%
Residents have made surgical errors due to post-call fatigue				
Yes	21	26	3	30
No	59	74	7	70
Residents have made medical errors due to post-call fatigue				
Yes	39	49	4	40
No	41	51	6	60

37% would like post-call days off to be mandatory. Residents and program directors shared similar feelings about imposing 80-hour weekly limits, with 70% of both groups against the restrictions. Assessment of whether an extension of residency should accompany a hypothetical 80-hour workweek restriction demonstrated that 63% of residents are against extending residency in this case, whereas 24% feel residency would need to be extended by 6 months and 13% by 1 year. Conversely, 70% of program directors felt residency would need to be increased by 1 year in the case of the 80-hour workweek restriction, 10% by 6 months, and 20% felt that no increase in training would be necessary. Nearly half (46%) of residents felt that an additional year of residency training would deter them from obtaining fellowship training, whereas only 10% of program directors felt this would deter their residents.

Perceptions Regarding Pressure to Work Post-Call

The majority of residents (56%) perceive pressure from their attending staff to work post-call regardless of how much sleep they have had; 33% do not perceive any pressure, and 11% are uncertain if this pressure exists. Similarly, 53% of residents perceived pressured by their resident peers to work post-call, whereas 37% did not and 11% were uncertain. Responses from program directors highlighted a contrast as 90% do not expect their residents to work post-call if they have had very little sleep. Residents also appear motivated to work post-call as 53% believe without doing so they wouldn't have enough time to master their surgical skills during residency (80% of program directors agree with this sentiment).

Perception of Resident Errors Due To Post-Call Fatigue

Residents and program directors had similar perceptions of the impact of post-call fatigue on surgical and medical errors (Table 6). A minority of residents (26%) and program directors (30%) felt that post-call fatigue had contributed to surgical errors made by residents. Regarding medical errors, 49% of residents and 40% of program directors felt that post-call fatigue had contributed to a medical oversight. The degree and significance of these errors was not quantified.

Table 7. Resident Concerns With Working Post-Call.^a

Resident Concerns With Working Post-Call		
	Mean	Median
Operative ability suffers	4	4
Ability to manage ward suffers	3.9	4
Decreased learning capacity	4.1	4
Decreased quality of life	4.3	4

^a 1 = strongly disagree, 5 = strongly agree.

Resident Concerns About Working Post-Call

Common resident concerns were evaluated on a 5-point Likert scale, with a score of 1 representing strong disagreement and a score of 5 representing strong agreement (Table 7). Residents, on average, “somewhat agree” that working post-call after being up most of the night partially impairs their operative capacity, ward management, learning capacity, and decreases their overall quality of life.

Discussion

At present, this is the first study to assess the self-reported work hour profile of Canadian plastic surgery residents and their perspectives on work hour restrictions as they pertain to training, patient care, and quality of life. Canadian plastic surgery residents were found to work on average 73 hours per week and have approximately 8 call shifts per month. The majority (88%) of respondents also stated that they take an average of zero post-call days per month, with 61% never taking post-call days off. The 73 hours worked per week is consistent with a previous study from British Columbia, which reported an average of 77 hours worked per week by surgical residents.³² It is slightly higher than the 67 hours worked per week by non-surgical residents in the same study and the 65 hours worked per week as reported by the Canadian Association of Interns and Residents.⁸ While plastic surgery residents work on average slightly more than non-surgical residents, the number of hours worked per week by Canadian plastic surgery residents is comparable to other Canadian surgical residents.

Canadian plastic surgery residents and program directors generally perceive work hour restrictions as negative and oppose their implementation. The majority (63%) of residents prefer optional rather than mandatory post-call days. Also, 69% of residents and 70% of program directors are against an 80-hour workweek restriction, with the majority of program directors and nearly half of the resident respondents calling for an increase in the duration of training if the 80-hour workweek limit is implemented. These data are consistent with other studies describing largely negative perceptions of duty hour limitations in surgical training, which state that the imposed work hour restrictions would impair training and result in graduates who are under-prepared to assume the responsibilities of an attending surgeon.³³⁻³⁴

Consistent with the opposition of residents and program directors to work hour restrictions is the presence of a culture

that appears to be against taking post-call days off. Approximately half of residents report that they feel pressured by their attending staff and fellow residents to work post-call, and half of residents and 90% of program directors feel that residents need to work post-call to master surgical skills. This sentiment was echoed by another study that describes the need for regular practice and assessment above and beyond simply achieving case minimums.³⁵ It follows that the Canadian plastic surgery training community (trainer and trainee alike) values the educational opportunities presented by working post-call and advocates for residents to work post-call in order to advance their training.

One of the main driving forces behind duty hour restrictions is the concern regarding the impact of fatigue on patient care. As a consequence of post-call fatigue, 26% of residents felt that they had made surgical errors and 49% felt that they had made medical errors. Similarly, surgical and medical errors made by residents as a perceived consequence of fatigue were reported by 30% and 40% of program directors, respectively. These perceptions were consistent with previously published studies that reported an approximate 35% increase in medical errors due to resident fatigue.^{2,36} However, it should not be overlooked that this reporting was based on perception, and the degree and significance of these errors was not quantified; therefore, these data should be interpreted with reservation. Other reports on the impact of sleep and fatigue on surgical error have yielded conflicting results. While some studies report that reduced sleep impairs residents' abilities to perform surgical simulations, others disagree.³⁷⁻³⁹ Despite this controversy, Scally et al report that since the implementation of the 2011 ACGME guidelines, outcomes for patients receiving surgical treatments at teaching hospitals have not improved.¹⁷ The large-scale, national randomized trial by Bilimoria et al of 4330 American general surgery residents who treated 138 691 patients over the course of 1 year demonstrated that more flexible duty hour restrictions were equally safe for patients in terms of death and both major and minor complications.⁷ The published objective data reporting conflicting results of the effects of fatigue on surgical performance coupled with reports demonstrating no improvements in surgical outcomes associated with duty hour restrictions call into question the benefit to patient care and safety conferred by duty hour restrictions in surgical training programs.

Another component of duty hour restrictions is the effect on resident wellness. On average, residents reported that they “somewhat agree” that they had decreased learning capacity and quality of life by working post-call. A recent systematic review agreed that there was increased resident quality of life secondary to duty hour restrictions but conflicting data describing the effect of duty hour restrictions on surgical performance and education.⁵ Despite the potential opportunity for increased quality of life by implementing mandatory work hour restrictions, it appears Canadian plastic surgery residents are willing to forgo this for additional surgical experience.

While this study suggests that Canadian plastic surgery residents and program directors oppose duty hour restrictions, it is important to note that the data presented here represent the opinions of the respondents of the survey. Bias associated with a

retrospective survey is a weakness of the study. A second weakness is the survey used has not been validated. Prospectively collected, objective, validated measures of medical and surgical errors made by plastic surgery residents post-call would give further data to correlate with the opinions reported here and limit recall bias. Objectively collected work hours would also need to be recorded to improve this report. Also, in Canada, the call guidelines are governed provincially, but the data reported here are pooled nationally. It follows that there may be provincial and institutional differences that have been overlooked.

In conclusion, we report here that the majority of Canadian plastic surgery residents and program directors oppose duty hour restrictions. The overwhelming majority of Canadian plastic surgery residents decline the option to take post-call days off for numerous reasons, including the desire to master their surgical skills in a supervised environment. If duty hour restrictions are aggressively implemented, many residents and program directors feel that an increased duration of training may be necessary to ensure adequate surgical competency.

Acknowledgements

The authors thank Kim Dalke for her research assistance.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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