Perspectives of anesthesia residents training in Canada on fellowship training, research, and future practice location

Les perspectives des résidents en anesthésie au Canada concernant la surspécialisation, la recherche, et l'emplacement de leur pratique future

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Abstract

Purpose We conducted this study to determine the preferences of anesthesia residents training in Canada for fellowship training, research, and future practice location and to identify the factors that influence those preferences.

Methods Using a cross-sectional study design, a survey was sent to all anesthesia residents enrolled at an accredited Canadian anesthesiology residency program ($N = 629$). Data were collected on demographics and preferences for fellowship training, research, and future

practice location. A multivariable logistic regression model was used to determine significant associations.

Results Two hundred forty-four residents (39%) responded to the survey. Seventy percent of residents intended to pursue fellowship training. The top three fellowships they favoured were regional anesthesia, intensive care, and cardiac anesthesia. Male sex was positively associated with the decision to pursue fellowship training, whereas having an additional graduate degree was negatively associated with this choice. Among those pursuing fellowship training, the most influential factors were personal interest, enhancing employability, and an interest in an academic career. Fifty-seven percent of residents preferred to work at an academic hospital. Thirty-four percent of residents intended to incorporate research into their future practice, and personal interest, employability, and colleagues were most influential in their decision. Research activity and publishing in residency were associated with the desire to pursue future research initiatives.

Conclusion The majority of anesthesia residents training in Canada choose to pursue fellowship training and work

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Author contributions James Khan, Jaclyn Gilbert, and Doreen Yee helped conceive the project, devise the study methodology, and oversaw the data collection. James Khan, Jaclyn Gilbert, Doreen Yee, Abhinav Sharma, and Yannick LeManach conducted the analyses. James Khan was the principal author of the manuscript. Jaclyn Gilbert, Doreen Yee, Abhinav Sharma, and Yannick LeManach were significant contributors in the writing of the manuscript.

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at an academic hospital. Approximately one-third of residents have an interest in incorporating research into their future careers.

Résumé

Objectif Nous avons réalisé cette étude afin de déterminer les préférences des résidents en anesthésie en formation au Canada concernant la surspécialisation (fellowship training), la recherche et l'emplacement de leur pratique future et d'identifier les facteurs influençant ces préférences.

Méthode Sur la base d'une méthodologie d'étude de prévalence, un sondage a été envoyé à tous les résidents en anesthésie enregistrés dans un programme canadien certifié de résidence en anesthésiologie ($n = 629$). Les données démographiques et les préférences en matière de surspécialisation, de recherche et d'emplacement futur de la pratique ont été colligées. Un modèle de régression logistique multivarié a été utilisé pour déterminer toute association significative.

Résultats Deux cent quarante-quatre (39 %) résidents ont répondu au questionnaire. Soixante-dix pour cent des résidents avaient l'intention de se surspécialiser. Les trois surspécialisations préférées étaient l'anesthésie régionale, les soins intensifs et l'anesthésie cardiaque. Le sexe masculin était associé de façon positive à la décision de poursuivre un programme de surspécialisation, alors que le fait d'avoir déjà un diplôme d'études supérieures était négativement associé à ce choix. Parmi les résidents poursuivant un programme de surspécialisation, les facteurs les plus importants dans leur décision étaient l'intérêt personnel, une meilleure employabilité et l'intérêt pour une carrière académique. Cinquante-sept pour cent des résidents préféraient travailler dans un hôpital universitaire. Trente-quatre pour cent des résidents avaient l'intention d'intégrer la recherche dans leur pratique future, et l'intérêt personnel, l'employabilité et les collègues constituaient les facteurs d'influence les plus importants dans leur décision. Les activités de recherche et la publication au cours de la résidence étaient associées au désir de poursuivre des initiatives de recherche à l'avenir.

Conclusion La majorité des résidents en anesthésie en formation au Canada choisissent de se surspécialiser et de travailler dans un hôpital universitaire. Environ un tiers des résidents manifestent un désir d'intégrer la recherche dans leurs carrières futures.

Throughout the five years of Canadian anesthesia residency training, residents are faced with several pivotal decisions: whether to pursue subspecialty fellowship training or perhaps to obtain a graduate degree; whether to choose

an academic or community practice; what city/town in which to practice; and other aspects of their future career. These decisions are influenced by a variety of personal and professional factors specific to each individual.

Understanding the factors involved in a resident's decision-making process is invaluable to residency program planning and curriculum development. Among pediatric residents, role models, lifestyle issues, and opportunities for teaching were the most important factors in making decisions for their career.¹ In considering pursuit of subspecialty training, internal medicine residents are most influenced by income potential, a particular scope of practice, and personal factors, such as family time.² General surgery residents are influenced by lifestyle factors and personal debt,³ whereas ophthalmology residents are most influenced by a desire to acquire special skills and prestige.⁴ Factors affecting career decision-making are multifactorial, and each specialty presents unique considerations in career planning.

There is a paucity of data assessing the factors that influence the career decisions of anesthesia residents in Canada. Further, data suggests that fewer anesthesia residents are pursuing a career in academic medicine.^{5,6} Exploring career preferences among anesthesia residents in Canada may provide a greater understanding of this trend and highlight potential factors associated with a desire to pursue future research. The purpose of this study was to determine the preferences of anesthesia residents training in Canada for fellowship training, research, and future practice location and to determine the factors that influence those preferences.

Methods

A 22-item questionnaire (Appendix; available as Electronic Supplementary Material) was developed that assessed four domains: (1) demographic information, such as age, sex, year of residency training, residency program, current/previous graduate training, research activities, publications in residency; (2) desire to pursue fellowship training, type of fellowship, and influential factors; (3) desire to pursue future research and influential factors; and (4) preferences for future practice location and influential factors. The target population of the survey was residents training in an accredited Canadian anesthesiology residency program, and the sampling frame was anesthesia residents identified by the Association of Canadian University Departments of Anesthesiology (ACUDA).

Survey item generation was based on factors influential in resident career decision-making identified in the literature,^{1-4,7-9} along with focus groups of anesthesia residents from McMaster University and the University of

Toronto, and consultation with an anesthesia residency program director and a fellowship program director. Item generation was performed over an eight-week period. The study authors reduced the number of items by consensus in order to decrease redundancy in the survey, while maintaining questions in the four pre-specified domains. A group of anesthesia residents then piloted the questionnaire to ensure clarity and ease of completion. Item reduction was performed over a four-week period.

Research ethics approval was obtained from Sunnybrook Health Sciences Centre (November 2013). An e-mail was then sent out to all anesthesia residents (postgraduate years 1-5) currently enrolled in one of the 17 accredited Canadian anesthesiology residency programs through each program's Canadian Anesthesiologists' Society resident representative. The e-mail contained information on the nature and purpose of the study, study objectives, information on voluntary involvement, study confidentiality policies, and a link to the online electronic survey hosted by SurveyMonkey.com (Portland, OR, USA). Consent was implied when residents voluntarily accessed the online survey link. The survey was first sent out on November 25, 2013. Weekly e-mails were sent to remind residents to fill out the survey. The survey remained online until December 22, 2013. All data were secured online and password protected, and only the first two authors (J.K. and J.G.) downloaded the data from the online survey tool.

Statistical analysis

Data responses were summarized using mean (SD) for continuous variables and frequency (percentage) for nominal variables. The survey response rate was calculated using the number of responses divided by the total number of anesthesia residents in Canada. Based on numbers reported by the ACUDA and with confirmation from contacting each program directly, there were 629 anesthesiology residents registered at an accredited

Canadian anesthesiology residency program as of January 2013. Association with the dichotomous outcomes of wanting to pursue fellowship training or future research was assessed using a multivariable logistic regression model. Independent variables in the model included demographic information (age, sex, postgraduate year, previous graduate degree, and graduate training in residency) and research or publications during residency. Stability of the multivariable logistic regression model provided the minimum number of respondents required. Assuming a 40% event rate of respondents desiring to pursue fellowship, a minimum of 175 respondents were needed to include seven variables in the model. If a response rate less than 175 was received, the number of variables in the model would be reduced to ensure stability and reduce overfitting. Statistical analyses were conducted using SPSS® version 20 (SPSS Inc, Chicago, IL, USA). All tests used an $\alpha = 0.05$ level of significance.

Results

Demographics

Of 629 residents registered at an accredited Canadian anesthesiology residency program, 244 residents responded to the survey (39% response rate). Three residents completed only demographic information and were thus excluded from further analysis, yielding 241 residents for analysis (Fig. 1). The mean (SD) age of respondents was 30 (4) years old. There were 142 male (58%) and 102 female (42%) respondents. Responses were obtained from residents from all postgraduate years and from each of the 17 accredited Canadian anesthesiology residency programs (Table 1). Forty-five respondents (19%) possessed an additional graduate degree, while another nine respondents (4%) were currently enrolled in a graduate program during residency (Table 1). Those with another

Fig. 1 Flow diagram of survey distribution and collection

graduate degree were significantly older than those without another graduate degree (32.2 yr vs 29.5 yr, respectively; $P < 0.001$).

Fellowship preferences

One hundred and sixty-eight (70%) respondents indicated that they plan to pursue fellowship training. Regional anesthesia (34%), intensive care (32%), cardiac anesthesia (32%), and acute or chronic pain (25%) were the most common anesthesia fellowships that residents planned to pursue or to which they had submitted applications, or were matched for the upcoming year (Fig. 2). Among those deciding to pursue fellowship training, personal interest (79%), enhancing employability (72%), and interest in academic career (55%) were the most common factors influencing this decision (Fig. 3).

Of the 30% of residents who did not plan on pursuing fellowship training, 71% responded that family or personal factors were influential in their decision. Other influential factors reported by these residents included lifestyle (59%), interest in general anesthesia (i.e., interest in the scope of anesthesia practice typically found in a community hospital; 56%), disinterest in an academic career (41%), and employability (29%).

In the logistic regression model, only male sex (adjusted odds ratio [aOR] 1.87; 95% CI: 1.03 to 3.40; $P = 0.04$) was associated with wanting to pursue fellowship training. In contrast, a previous graduate degree prior to residency (aOR 0.52; 95% CI: 0.30 to 0.91; $P = 0.02$) was negatively associated with the desire to pursue fellowship training (Table 2).

In considering location of fellowship training, the most influential factors were family or personal factors (61%), followed by an institution's reputation (59%), city of institution (56%), proximity to home (31%), job possibilities at institution (27%), and influential mentor (18%).

Research preferences

Seventy-nine respondents (34%) indicated that they plan to incorporate research into their future practice, whereas 86 respondents (38%) did not want to pursue research after residency. A considerable proportion of respondents (28%) were still unsure whether they would pursue research in the future.

When those who plan to incorporate research into their practice were asked to identify the factors most influential in their decision, the most common responses were interest (91%), employability (27%), colleagues (15%), and lifestyle (15%) (Fig. 4). Only 5% of residents identified income potential as a factor in their decision to pursue

Table 1 Demographic information of respondents

Variable	
Age yr, mean (SD)	30 (4.1)
Sex male/female, <i>n</i> (%)	142 (58) / 102 (42)
Previous graduate degree <i>n</i> (%)	46 (20)
Masters	34 (76)
MBA	1 (2)
PhD	11 (24)
Current enrolment in graduate studies <i>n</i> (%)	9 (4)
Postgraduate Year (PGY) <i>n</i> (%)	
PGY-1	53 (21.7)
PGY-2	40 (16.4)
PGY-3	57 (23.4)
PGY-4	46 (18.9)
PGY-5	48 (19.7)
Program (<i>n</i> of residents in program)	Total respondents, <i>n</i> (%)
Alberta (29)	4 (1.6)
Calgary (37)	3 (1.2)
Dalhousie (25)	20 (8.2)
Laval (40)	14 (5.7)
Manitoba (16)	9 (3.7)
McGill (36)	9 (3.7)
McMaster (35)	26 (10.2)
Memorial (22)	13 (5.3)
Montreal (43)	16 (6.6)
NOSM (2)	1 (0.4)
Ottawa (54)	32 (13.1)
Queen's (24)	10 (4.1)
Saskatchewan (36)	8 (3.3)
Sherbrooke (34)	7 (2.9)
Toronto (97)	42 (17.2)
UBC (53)	18 (7.4)
UW (46)	12 (4.9)

MBA = Master of business administration; NOSM = Northern Ontario School of Medicine; PGY = postgraduate year; PhD = Doctor of philosophy; SD = standard deviation; UBC = University of British Columbia; UW = Western University

research. Conversely, among those who did not plan to pursue research in the future, the most common responses were lack of interest (78%), lifestyle (28%), lack of experience (27%), and family or personal reasons (21%). These were the same top factors reported by those who were unsure about pursuing research after residency. In contrast to those planning to pursue research, employability (1%) and colleagues (1%) were the least influential factors reported in those not intending to pursue research.

When surveyed regarding research activities, 162 respondents (69%) indicated that they have participated in research activities during residency. Furthermore, 44 residents (19%) indicated that they have published a

Fig. 2 Anesthesia fellowship training programs that anesthesia residents plan to pursue or to which they have applied or are matched for the upcoming year

Fig. 3 Influential factors for residents who decided to pursue fellowship training after residency. pd = program director

manuscript during residency. In the logistic regression model examining independent factors predictive of future research intent, research activities during residency (aOR 3.50; 95% CI: 1.56 to 7.90; $P = 0.003$) and a published manuscript in residency (aOR 4.40; 95% CI: 2.02 to 9.56; $P < 0.001$) were associated with incorporating research into future practice (Table 2). Residents who plan to pursue fellowship training were also more likely to pursue research activities in their future practice ($P < 0.001$).

Future practice location

When asked where they intend to practice upon completion of their training, 90 residents (38%) responded at a different institution but in the same province, 87 residents (37%) answered at the same institution, and 45 residents (19%) replied out-of-province.

The majority of respondents (56%) indicated that they prefer to practice at an academic hospital over a community hospital after completion of their training. The top three common factors that influence a resident's preference for their desired future practice location (academic or community) were: city or town of practice (68%), family or personal reasons (67%), and lifestyle (62%) (Fig. 5).

Of the residents intending to pursue a fellowship, 71% of respondents plan to practice at an academic hospital, whereas only 18% of residents not intending to pursue a fellowship intend to practice at an academic hospital. The desire to pursue fellowship training was significantly associated with the desire to obtain a position at an academic institution (OR 14.2; 95% CI: 7.0 to 28.8; $P < 0.001$). Similarly, the desire to pursue research activities was also associated with the desire to work at an academic institution (OR 5.1; 95% CI: 2.7 to 9.6; $P < 0.001$).

Table 2 Unadjusted and adjusted odds ratios for factors included in the multivariable logistic regression models

Variable	Fellowship Model		Research Model	
	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Age	0.91 (0.85 to 0.98)*	0.93 (0.86 to 1.01)	1.08 (1.01 to 1.16)*	1.06 (0.98 to 1.15)
Sex	1.71 (0.98 to 2.98)	1.87 (1.03 to 3.40)*	1.13 (0.65 to 1.97)	1.09 (0.59 to 2.02)
Postgraduate year	0.95 (0.78 to 1.16)	0.93 (0.73 to 1.17)	1.16 (0.96 to 1.41)	0.85 (0.66 to 1.10)
Previous graduate degree	0.42 (0.22 to 0.81)*	0.52 (0.30 to 0.91)*	1.20 (0.61 to 2.35)	0.87 (0.48 to 1.58)
Currently in graduate studies	0.86 (0.25 to 2.96)	0.90 (0.22 to 3.68)	1.44 (0.44 to 4.69)	0.76 (0.19 to 3.09)
Research activities in residency	1.35 (0.75 to 2.44)	1.70 (0.83 to 3.46)	4.08 (2.00 to 8.32)*	3.50 (1.56 to 7.90)*
Published in residency	1.25 (0.60 to 2.60)	1.49 (0.64 to 3.48)	6.21 (3.05 to 12.67)*	4.40 (2.02 to 9.56)*

CI = confidence interval. *Statistically significant

Fig. 4 Influential factors for residents who decided to pursue research after residency **Fig. 5** Factors influencing a resident's preference for future practice location

Discussion

This study investigates preferences and motivations of anesthesia residents training in Canada regarding their future career plans. With responses from residents in all 17 Canadian accredited anesthesiology residency programs

and a 39% response rate with roughly equal representation across the postgraduate years, this study provides a snapshot of the demographic landscape of anesthesia residents in Canada.

Our results indicate that a large majority of anesthesia residents (70%) plan to pursue fellowship training. This is

similar to fellowship interest seen in other disciplines.^{8,10-12} Furthermore, 34% of residents plan to pursue research in their future practice, and 56% of residents desire to practice at an academic hospital.

The logistic regression analysis revealed that only male sex is associated with the desire to pursue fellowship training. Similarly, other studies have also shown that females were less likely to pursue subspecialty training, including pediatric¹³ and ophthalmology⁴ residents. Potential factors discouraging female residents towards fellowship training include differential domestic and childcare responsibilities,¹⁴ importance on income potential,¹⁵ and susceptibility to burnout.¹⁶ Females are also underrepresented in academic anesthesia, and studies of U.S. academic anesthesiologists suggest that females have less research productivity compared with their male colleagues.¹⁷ Nevertheless, when analyzing mid-career research productivity, females surpass their male colleagues,¹⁷ suggesting that future contributions of females to academic departments should not be overlooked when considering departmental hiring policies. Given that mentored residents are more likely to pursue an academic career,^{18,19} residency program directors may consider formal mentorship programs to inspire residents to pursue fellowship training and a career in academia.

Another finding from the logistic regression analysis was that the presence of a graduate degree prior to residency was negatively associated with the desire to pursue fellowship training. Residents with a previous graduate degree have longer pre-residency training periods and may prefer to enter the workforce sooner. This notion is supported by the fact that those with a previous graduate degree are older and a graduate degree did not alter one's desire to pursue future research activities, a pursuit that is not necessarily associated with a longer training period.

Despite a multitude of factors that weigh into career decision-making, common factors emerged from this study as influential in shaping future career pursuits. Personal interest was the most common factor influencing those planning to pursue fellowship training and research after residency. Accordingly, lack of interest was the top factor for those who were unsure and those who did not want to pursue future research. Given that approximately one-third of residents were unsure about pursuing future research, this represents a target group to cultivate interest. The literature suggests that early and appropriate exposure appear as central tenets in inspiring interest in research among residents.²⁰ While allocating research time in residency will come at the expense of resource provisions and reduced clinical exposure,²¹ the benefits are suggested by the results of our logistic regression model, which show

that resident research activity is associated with the desire to pursue research after graduation.

Enhancing employability was the second most common factor for those desiring to pursue fellowship training and research after residency. A survey by the Royal College of Physicians and Surgeons of Canada indicated that 16% of specialists or subspecialists are unable to secure employment, and 31% of new graduates pursued further training because they thought it would increase their employability.²² Our study indicates that residents in Canada experience current job market pressures early on. Pursuing fellowship training or research activities are prudent acts in a competitive job market. Fellowship-trained physicians are attractive to an institution, as their subspecialty knowledge can be shared with other faculty members and residents, and they can further expand an already existing subspecialty program.²³ Furthermore, recent studies suggest that the number of anesthesia clinician-scientists are decreasing, and academic output of individual anesthesia departments are on the decline.⁵ Thus, residents interested in incorporating research or a fellowship into their career may have a competitive advantage in hiring processes at academic institutions.^{5,24,25}

The four most popular anesthesia subspecialties were regional anesthesia, intensive care, cardiac anesthesia, and acute or chronic pain. The popularity of regional anesthesia may be to increase skill in performing regional blocks, as many U.S. anesthesia residents finish their residency training and are still not confident in performing certain regional block techniques.²⁶ Furthermore, academic institutions may favour anesthesiologists trained in regional anesthesia due to patient and surgeon preference for regional anesthetic options and subspecialty education for residents.²⁷⁻²⁹

Preference for a particular location of future practice also provides insight into significant considerations in resident career planning. The majority of residents prioritized family or personal reasons and city of institution in deciding location of future practice, whereas those interested in fellowship training and research placed more weight on colleagues, teaching, and research opportunities. This finding suggests that the career plans of anesthesia residents training in Canada are not based solely on professional aspirations but require consideration of personal interests, recreational pursuits, and needs of family members.

There are several limitations to this current investigation. First, although the overall survey response rate of 39% is comparable with other unsolicited e-mail surveys of career preferences,⁷ the data collected in this study may not be entirely representative of all anesthesia residents in Canada, as more than half of the nation's

residents were not captured. Second, certain fellowships, such as trauma or combination fellowships, were not captured. Third, certain questions in the survey could have been clearer for the intended type of response. For example, further clarification could have been provided when asking about future practice location (academic or community) to ensure the responder understood that location and not type of career (academic career) was being considered. Similar clarification could have been provided for responses such as family, ethnicity, or personal factors. Lastly, this study examines a resident's intention rather than actual career decision, and thus, the results of this study must be interpreted accordingly.

Understanding the career preferences of residents can help to inform residency program curriculum and planning. Nevertheless, the preferences of anesthesia residents and influential factors may change as the anesthesiologist's role evolves, new technologies emerge, and the job market fluctuates. This study will serve as a benchmark to document the career preferences and motivations of anesthesia residents training in Canada.

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Conflicts of interest None declared.

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