Survey Report

Canadian Anesthesia Physician Resources: 1996 and beyond

Neil Donen MB CHB FRCPC,*
Frank King MD FRCPC,†
Dennis Reid MB CHB FRCPC,‡
Derek Blackstock MB BCH FRCPC§

Purpose: To report physician resource information from the 1996 national anesthesia physician and residency programme surveys in Canada. The findings are used to discuss the potential effects on availability of future specialist anesthesia services in Canada.

Methods: Twenty-six hundred and ninety-three physicians (2,206 specialists, 487 family physicians) providing anesthesia services were surveyed. Information on demographics and patterns of clinical practice were sought. Anesthesia programme directors provided trainee information. Projections of the potential number of practicing anesthesiologists to 2026 were made based on the number of available training positions and age distribution of anesthesiologists.

Results: There was a 58.3% response rate to the national survey. Since 1986 there has been a 10% increase in the number of specialist anesthesiologists. Marked regional variations in age distribution and changes in the number of specialist anesthesiologists were noted. Most specialists remain in the region or province of postgraduate training. Sixty percent of specialists were either re-entry trainees or international medical graduates. Changes in anesthesia practice patterns have resulted in 40% of the anesthesiologist's work now occurring outside of the operating room. Anesthesia training positions have decreased by at least 15%. The population of Canada is projected to increase by 33.8% between 1996 and 2026. If current government and position allocation policies continue, it is projected there will be 0% increase in the number of specialist anesthesiologists over the same time period.

Conclusions: Changes in anesthesia practices have exacerbated the current shortages of anesthesiologists. These shortages will worsen if the number of, and restrictions to, available residency positions is unchanged.

Objectif : Rendre compte des ressources médicales à partir des informations provenant d'enquêtes nationales réalisées en 1996 sur les programmes de résidence et auprès des médecins anesthésiologistes du Canada. Les résultats permettent d'exposer les effets potentiels sur la disponibilité de futurs services spécialisés en anesthésie.

Méthode : Le formulaire d'enquête a été envoyé à 2 693 médecins (2 206 spécialistes et 487 omnipraticiens) qui pratiquent l'anesthésie. On recherchait des informations démographiques ainsi que des modèles de pratique clinique. Les directeurs de programmes d'anesthésie ont fourni les renseignements sur la formation. Des projections jusqu'en 2026, sur le nombre potentiel d'anesthésiologistes en pratique, ont été faites sur la base du nombre de places possibles pour les résidents et de la distribution de l'âge des anesthésiologistes.

Résultats : Le taux de réponse à l'enquête nationale a été de 58,3 %. Depuis 1986, le nombre d'anesthésiologistes a augmenté de 10 %. On a noté des variations régionales marquées dans la distribution de l'âge et des changements du nombre de spécialistes en anesthésie. La plupart travaillent dans la région ou la province où ils ont eu leur formation. Soixante pour cent étaient des omnipraticiens, ou des diplômés de médecine formés à l'étranger, qui avaient étudié l'anesthésie. Les changements de modèles de pratique font que 40 % du travail de l'anesthésiologiste ont lieu en dehors de la salle d'opération. Les places en résidence ont baissé d'au moins 15 %. Or, la population canadienne devrait s'accroître de 33,8 % entre 1996 et 2026. Mais si le gouvernement actuel maintient ses politiques d'allocation de places, on prévoit qu'il y aura 0 % d'augmentation du nombre de spécialistes anesthésiologistes pendant cette période.

Conclusion : Les changements dans la pratique de l'anesthésie ont aggravé le manque actuel d'anesthésiologistes. Cette pénurie va augmenter si le nombre de places disponibles en résidence, ou leur restriction, ne changent pas.

From the Departments of Anesthesia, University of Manitoba,* Memorial University,† University of Ottawa,‡ and the University of British Columbia§

Address correspondence to: Dr. Neil Donen, 301-320 Menzies Street, Victoria, British Columbia, Canada V8V 2G9
Phone: 250-385-9966; E-mail: ndonen@home.com

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ANESTHESIA services play an important role in the successful delivery of hospital based health care. In the United Kingdom it is estimated that anesthesiologists are involved in the care of two-thirds of all admitted patients.¹ The range of delivered services has made assessment of anesthesia human resources both complex and difficult.^{2,3} The difficulty of documenting the diverse nature of anesthesia services and their equivalent full-time (EFT) workloads may be one reason why anesthesia was excluded from analysis in a recent Canadian physician resource study.^{4,5}

Because of a perceived shortage of anesthesiologists and no formal studies for at least 10 yr, the Canadian Anesthesiologists' Society (CAS) undertook a national survey of all physicians providing anesthesia services in 1996. Anesthesia residency information was also reviewed. This arose from a concern voiced by Department Heads and Programme Directors of the potential effects of decreased residency positions on the adequacy of future numbers of anesthesiologists. This paper presents some of the key results arising from analysis of these two studies. Another recent survey,⁶ newspaper reports^{7,8} and journal advertisements⁹ complement the findings of wide spread anesthesia shortages across Canada.

Methods

The Physician Resource Committee (PRC) of the CAS identified all physicians providing anesthesia services in Canada as of December 31, 1995. A four page, 17 question survey was mailed in March 1996 to all identified physicians providing anesthesia services in Canada. Information requested included demographic data, clinical practice patterns, funding sources, workload issues and clinical practice history prior to anesthesia training. The survey was again mailed to non-respondents in May 1996.

Dates of birth of physicians were obtained from the existing CAS database, the Canadian Medical Association and/or directly from the CAS survey questionnaires. Age is reported as at June 30 1996.

All anesthesiologists were classified into one of three categories:

- *certified specialist anesthesiologist*: an anesthesiologist certified by the Royal College of Physicians and Surgeons of Canada (RCPSC) and/or the Corporation professionnelle des médecins du Québec (CPMQ).
- *non-certified specialist anesthesiologist*: a physician, who, on the basis of training and/or experience, is working as a specialist anesthesiologist.

- *family practice anesthesiologist*: All other physicians providing anesthesia services.

The term specialist anesthesiologist is used throughout this paper to denote certified and non-certified specialist anesthesiologists.

The survey results are presented on a regional basis. The five defined regions are Atlantic (Newfoundland, New Brunswick, Nova Scotia and Prince Edward Island), Québec, Ontario, Prairies (Manitoba, Saskatchewan and Alberta) and British Columbia including the Territories.

The location of current practice was compared with the location of postgraduate anesthesia training. If some or all anesthesia training was undertaken in the province of current residence or region then that province/region was deemed to be the location of anesthesia residency training. If some or all of an anesthesiologist's training was undertaken outside North America, the physician was classified as an International Medical Graduate (IMG). Comparisons are made with previously available data from the 1986 validation study undertaken by the CAS.¹⁰

All trainees in Canadian anesthesia programmes are included in the CAS database. Trainee information is obtained directly from all anesthesia postgraduate programme directors in Canada. The residency database was last updated in June 1998 and includes withdrawals from, and late additions to programmes.

Projections on the potential anesthesia physician numbers based on current policies i.e. no change in number of available residency positions and no entry of IMG specialist anesthetists into the anesthesia workforce, through to the year 2026 were made. To account for specialists leaving the workforce it is assumed that anesthesiologists will retire when they reached 65 yr of age. Data utilizing current ages on June 30, 1996 was used to calculate the number of retirees. Based on information from the ongoing CAS PRC monitoring process, it is projected, on average, an additional five practicing anesthesiologists will die each year. As we are aware that there has been some response by government and university agencies to the perceived current shortage we undertook two additional projections based on a number of assumptions. The first assumption is that the number of annual training positions made available would be increased. The second assumption, for similar reasons, was that each year some IMGs would be permitted to enter Canada to practice anesthesia. The two additional calculations assumed an extra 100 or 200 anesthesiologists being added to the workforce over each of the ten year periods.

Canadian population data was obtained from Statistics Canada's web site on the world wide web.¹¹ Medium population growth estimates from 1996 through 2016 were also obtained from the web site. These were extrapolated to the year 2026.

Results

Twenty-six hundred and ninety-three physicians, 2,206 specialists and 487 family physicians were surveyed. Information on physician birth dates was available for 2,653 anesthesiologists (98.7%). Four respondents indicated they were in full-time administrative practice. Fifteen hundred and seventy-one (58.3%) survey responses were eligible for data analysis. Of these, 1,335 were specialist anesthesiologists (60.5% of all specialists).

Specialist Anesthesiologists

The number of practicing specialists and their locations of practice in 1986 and 1996 are shown in Table I. Since 1986 there has been an increase of 200 specialist anesthesiologists in the work force. The biggest increases were in Quebec and Saskatchewan while the Atlantic Provinces suffered a net loss of anesthesiologists. Non-certified specialist anesthesiologists constitute 14.7% of anesthesiologists in the Atlantic region and 5.1% of all specialist anesthesiologists in Canada.

The mean and median ages of Canadian specialist anesthesiologists are 47.6 and 46 yr respectively with 27% over the age of 55 (Table II). There is marked

regional variation in age distribution. For example, in British Columbia, only 2.3% of practicing specialist anesthesiologists are > 65 yr., while 13.1% of anesthesiologists in Quebec are > 65 yr. Compared with 1986 there has been a decrease in the percentage distribution of anesthesiologists under age 35 yr. Increases in the percentage distribution of anesthesiologists between 35 – 44 yr and > age 65 yr were noted as a persistent trend.

Most specialists trained in a province or region tend to locate their anesthesia practice in the same region (Table III). The weakest affiliation is in the Atlantic region where approximately 40% of physicians stay in the home province and only 57% remain in the region. Two hundred and twelve (15.9%) of the 1,335 specialists responding to the survey undertook some or all of their postgraduate anesthesia training outside North America. In the Atlantic region they constitute 35% of the specialist anesthesiologists.

The large majority of specialist anesthesiologists are funded through fee-for-service (FFS). Two hundred and twenty seven (17%) respondents indicated that more than 20% of their income came from non-FFS sources (salary, block funding, sessional fees or other). The average hours worked per week by specialists was 44 hr. An additional 16 hr per wk were devoted to in-hospital call. The majority (85.6%) worked five days per week. Many provide services outside the operating room (Table IV). This averaged from a low of 24.8% of all respondents undertaking chronic pain manage-

TABLE I Distribution and percent changes in specialist anesthesiologists and population between 1986 and 1996

	1986	1996	1986 - 1996	1986 - 1996
REGIONS, PROVINCES AND TERRITORIES	Total Specialists*	Total specialists*	% change Specialists	% change Population
<i>Atlantic</i>	197	185	(7.1)	5.9
- Newfoundland	44	38	(13.6)	0.4
- Nova Scotia	93	88	(5.4)	8.4
- Prince Edward Island	6	7	16.7	7.3
- New Brunswick	54	52	(3.7)	8.4
<i>Quebec</i>	459	585	27.4	13.0
<i>Ontario</i>	749	786	4.9	23.5
<i>Prairies</i>	308	348	13.0	11.2
- Manitoba	92	97	5.4	6.7
- Saskatchewan	53	67	26.4	1.2
- Alberta	163	184	12.9	17.4
<i>BC & Territories</i>	293	302	3.1	33.3
- British Columbia	292	301	3.1	33.4
- NW Territories	0	0	0	27.5
- Yukon	1	1	0	34.0
Canada	2006	2206†	10.0	18.2

* Specialists include certified and non-certified specialist anesthesiologists

† Includes four specialist anesthesiologists who are in full-time administrative practice

TABLE II Percent age distribution: Anesthesiologists – June 1996

	<35 yr	35–44 yr	45–54 yr	55–64 yr	65+ yr.
*Canada	8.2	38.1	26.7	19.3	7.7
*Atlantic Region	6.6	39.3	27.9	17.5	7.6
*Quebec	10.5	32.8	20.6	23.0	13.1
*Ontario	7.9	37.7	28.6	18.8	7.0
*Prairies	8.1	46.8	25.7	14.4	4.9
*British Columbia	5.0	38.7	34.3	20.0	2.3
Family Practice	9.2	42.1	32.0	12.5	4.2

* Specialist anesthesiologists

TABLE III Percent distribution of trainees who remain in province/region of training Specialist anesthesiologists 1996

Location of training	Percent remaining in region	Percent remaining in province of training
Atlantic	57.4	41.8
Quebec	79.0	79.0
Ontario	75.8	75.8
Prairies	74.3	61.5
British Columbia	82.5	82.5

ment care to a high of 60% of respondents providing obstetrical anesthesia services. (Middle column, Table IV). The last column indicates the number of anesthesiologists where these services make up < 25% of their total practice. For example, 536 (40%) of respondents indicated that provision of obstetrical anesthesia services occupied < 25% of their anesthesia practice. A majority of anesthesiologists are involved in more than one out-of-operating-room clinical activity. It is estimated that these services consume, on average, two days of the specialists' workweek.

Five hundred and ninety-four (44.5%) of the specialists responding indicated they had been in clinical practice prior to entering an anesthesia training programme. The average length of time in clinical practice was 3.6 yr.

Family Practice Anesthesiologists

Almost 85% of the family physicians providing anesthesia services are located in Ontario, the Prairies or British Columbia (37.3%, 31.3% and 16.3% respectively). Eighty-five percent of physicians practicing anesthesia in the Yukon and Northwest Territories are family practitioners. Most family practice anesthesiologists (78.5%) provide < 16 hr per wk of anesthesia. Just over a quarter (28.7%) deliver < eight hours of weekly anesthesia.

TABLE IV Distribution of anesthesia services provided by specialist anesthesiologists*

	Number of anesthesiologists providing service (% of total number)	Number where service makes up <25% of total practice (% of total number)
<i>Services in the Operating Room</i>		
Adult Anesthesia	1186 (88.8)	137 (10.3)
Pediatric Anesthesia	708 (53.0)	469 (35.1)
<i>Services outside the Operating Room</i>		
Obstetric Anesthesia	801 (60.0)	536 (40.1)
Preoperative Clinic	760 (56.9)	644 (48.2)
Acute Pain Management	667 (50.0)	564 (42.2)
Intensive Care	389 (29.1)	278 (20.8)
Chronic Pain Management	331 (24.8)	225 (16.9)

* See text for description on interpreting table

TABLE V Anesthesia Specialty Training Residency information 1997–2003*

	1997	1998	1999	2000	2001	2002	2003
Expected to finish	77	77	80	80	81	70	72
Withdrawals to date	3	9	9	15	8	1	
Additions to date	0	1	6	1	13	8	

* Data correct as of June 30, 1998

Specialist Anesthesia Trainees

Five hundred and thirty-seven anesthesia trainees are expected to complete their residency training between 1997 and 2003 (Table V). Forty-five trainees have withdrawn from the various training programmes while 29 physicians have either transferred in from other programmes or been admitted as re-entry trainees. In the last five years, 13 (4.3%) positions from the Canadian Residency Matching Service (CaRMS) programme were not filled. Half of the trainees admitted through the second iteration of the CaRMS match have withdrawn from anesthesia programmes.

Population and Anesthesiologist Growth Rates.

Through to the year 2026, the Canadian population is projected to increase by 33.8% (Table VI).¹¹ Those over the age of 65 yr will increase by 220%. If the 1996 policies were to remain in place with respect to residency position numbers and IMGs there would be no increase in the total number of practicing anesthesiologists over this same 30-yr period. The Figure illustrates the effect of increasing the workforce of specialist anesthesiologists by 100 and 200 individuals over each 10 yr period.

TABLE VI Potential long-term effects of current specialist anesthesia resource planning

<i>Year</i>	<i>Additions to resource pool*</i>	<i>Deletions from resource pool</i>	<i>Balance (Additions minus deletions)</i>	<i>Number of Anesthesiologists (% change from previous decade)</i>	<i>Population† (% change from previous decade)</i>
1986				2,006	25,300,000
1996	900	700	200	2,206 (10%)	29,900,000 (18.2%)
2006	750	525	225	2,430 (10.2%)	33,700,000 (12.7%)
2016	700	690	10	2,440 (0.4%)	37,000,000 (9.8%)
2026	700	940	-240	2,200 (-8.4%)	40,000,000 (8.1%)

* No increase in number of residency positions. No new IMGs allowed into workforce

† Medium population growth estimates - Statistics Canada

N.B. Population > age 65 yr estimated to increase from 2,700,000 (1986) to 8,000,000 (2026)

Discussion

The CAS survey, recent issues relating to postgraduate training positions and Statistics Canada population data have highlighted the need for ongoing physician resource monitoring and planning. Integrating the various data sets has enabled us to explain some of the reasons for the perceived shortage of anesthesiologists. It has also permitted us to begin to look at the potential long-term effects of the current state of anesthesia physician resources and its requirements.

The 1986 CAS validation study identified 523 family physicians providing anesthesia. However, they excluded those physicians providing <eight hours per week of anesthesia or <200 anesthetics a year. It is estimated that between 500-1000 physicians were excluded as a result. The 1996 survey only identified 487 non-specialists providing anesthesia services. The declining number of family practice anesthesiologists has been well documented.^{12,13} A follow-up study on graduates of a Family Practices anesthesia residency training programme revealed that the average "anesthesia practice life-span" of the family practice anesthesiologist is < 10 yr.¹⁴ While there is a concern regarding the future delivery of anesthesia services in rural Canada, such a discussion is beyond the scope of this paper. We have thus concentrated further discussions on specialists only.

The marked regional variability relating to retention of trainees, international medical graduates practicing anesthesia, changes in numbers and age distribution of specialist anesthesiologists highlights a second area requiring an in depth analysis and discussion. In 1998, the CAS PRC committee members identified that anesthesia physician shortages affected the whole country. For this reason we have chosen to focus our discussion on anesthesia physician resource issues at a national rather than a regional level.

Between 1986 and 1996, the total number of specialist anesthesiologists increased by some 200. During the same period approximately 900 Canadians received their Royal College of Physicians and Surgeons certification.¹⁵ Death and retirement are calculated to account for some 600 specialists exiting from practice. The CAS PRC has estimated that another 100 physicians have relocated their practice outside of Canada. This number is difficult to quantify and is considered a "best guestimate" based on informal information gathering. The 10% change in anesthesia numbers contrasts sharply with other specialties where there has been a 20-25% increase in numbers during the same period.⁴ Population growth was 18% over these 10 yr.¹¹

If the current number of available anesthesia residency positions remains unchanged, approximately 750 specialist anesthesiologists will have been trained for the 10-yr period ending 2006. The decrease in numbers from the previous 10 yr can be attributed to the recommendation for a global 10% reduction in the total number of all residency training positions (to match those of the graduating classes) by Barer and Stoddart.¹⁶ Part of the reduction in numbers is also related to unfilled anesthesia positions (Table V). Clearly, generic decisions were made without weighing the consequences on selected specialties. Projecting growth to the year 2026 clearly shows that there will need to be at least 200 more specialist anesthesiologists, over and above the current numbers of trainees, added to the workforce each decade to keep pace with the predicted population growth.

The CAS survey achieved a 60% response rate, which is considered excellent. We believe that this allows us to extrapolate our findings as indicative of anesthesia practice and norms. The CAS survey has highlighted the diverse nature of anesthesia practice.

FIGURE Cumulative percent change in Canadian population and specialist anesthesiologists, 1996 - 2026: Comparison of no change in current policies *vs* including 100 or 200 extra anesthesiologists to workforce each decade

As this is the first such survey undertaken it is not possible to evaluate any changes in workload. However, we are aware of major changes in anesthesia practices over the past decade. Provision of obstetrical anesthesia services has become the norm and the number of acute and chronic pain services have increased dramatically. The shift to same day admission surgery and the establishment of preoperative assessment clinics has also moved anesthesiologists out of the operating room. We believe that these factors have been major additional contributors to the current shortage of anesthesiologists. The survey data collected serves as a benchmark for future assessments in workload and practice pattern changes.

Anesthesia has traditionally been a re-entry specialty. Forty-four percent of the survey respondents obtained their specialty certification through this route. Although a few general re-entry positions are now being offered, current policies, clearly related to the Barer-Stoddart report¹⁶ has effectively closed this route to anesthesia specialty certification. Concerns regarding the effect of eliminating re-entry positions on anesthesia physician resources have previously been voiced. In a 1991 survey amongst anesthesia trainees, only 19.6% had made their decision to enter anesthesia while they were still undergraduate medical school trainees.¹⁷ International Medical Graduates, another traditional source of anesthesia physician resources, are being discouraged in their entry into practice in

Canada by provincial medical licensing laws. In 1996, the Royal College of Physicians and Surgeons of Canada (RCPSC) adopted a policy of not crediting any non North American postgraduate training towards Canadian residency training.¹⁸ This has changed the route to specialty certification for IMGs from what was commonly one year of Canadian training, to five years of postgraduate training in Canada. The net effect has been a 60% loss (44% re-entrants, 16% IMGs) of the traditional pool of applicants as a result of externally imposed rule changes. The potential effect of these two recent policies on future delivered anesthesia services across Canada can be seen in our future projections and the decreased recruitment into anesthesia residency training positions.

Roos *et al.*, in a recent study, pointed out that patients over age 65 yr make up a considerable proportion of people undergoing a variety of surgical procedures (Cardiovascular surgery 57.7%, Urology 47.6%, General Surgery 39.7%, Orthopedics 32.8%).⁴ Medium population growth estimates by Statistics Canada predict that the percent of the population over age 65 yr will rise from 12% (3,650,000) in 1996 to 20% (8,000,000) by the year 2026.¹¹ It is more than likely that the aging of the Canadian population will see an increase in the number of surgical procedures. To quote Ryten, these are the "dynamics driving growth in physician supply."¹⁹ We believe the shortage of anesthesiologists will severely compromise the ability of the health-care system to provide surgical and other services to those who need them currently and in the future.

There is much discussion as to the most appropriate approach to physician resource planning.¹⁹⁻²⁵ They include needs-based assessments, benchmarking and estimating the number of operative procedures performed per year. It has been recommended that physician resource planning be based on workload and not physician-population (P-P) ratios. The common workload methodology in Canada is to use service volumes from the FFS billings and the billings themselves as the basis for calculating need and the number of EFT physicians. Difficulties in capturing work undertaken by anesthesiologists using FFS billings are highlighted from the survey responses. Approximately 40% of the anesthesiologists' workload occur outside the operating room and almost one in five respondent indicated that more than 20% of their income came from non-FFS sources. Clearly, using physician billings as a means of gauging anesthesia workload and EFT requirements is not appropriate. A second difficulty in calculating anesthesia requirements has been to try and include work undertaken by family practice anesthesiologists. Like specialists, they have variable

funding sources and provide anesthesia services outside of the operating room.

The factors we have identified as contributing to the current and future shortages of qualified anesthesiologists include:

1. The changing nature of delivered anesthesia services.
2. The aging of the Canadian population.
3. The rapid population growth compared to the number of anesthesiologists available to provide the necessary services.
4. The decreased number of anesthesia training positions.
5. The entry restrictions into anesthesia training positions.

We believe there is a need, both in the short and long-term, to look at possible solutions.

Some of the short-term solutions that could be studied include: Fast tracking a review of the current RCPSC policy on postgraduate IMG training; medical licensing authorities taking steps to evaluate and recognize anesthesia training done outside of Canada; increasing the number of anesthesia residency positions through re-entry training positions and; establishing an ongoing, active database which tracks trends in workload, skill-mix requirements and number of anesthesiologists. In the longer term there is a need to promote and mentor the practice of anesthesia amongst medical students. The responsibility for these decisions is seen to rest with the Provincial/Territorial Medical Licensing Authorities, the Ministries of Health, Postgraduate medical school deans, the RCPSC and the CAS.

The data from the studies identify a need to move on this issue now. Continued delay and procrastination will only serve to exacerbate the current and projected future shortage of anesthesiologists. Given the increasingly strident demands for the provision of anesthesia services in the operating room, the spectre of anesthesiologists being forced to restrict their skills and practice to this arena only is a distinct possibility. We, as practicing clinicians, also need to clearly articulate what the practice of anesthesia is, and should be, in terms of our contributions to patient care.

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