A survey-based assessment of the Canadian pediatric surgery workforce

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Background: There is significant lack of information regarding the Canadian pediatric surgery workforce. With few exceptions, Canadian pediatric surgeons practice exclusively in university-affiliated free-standing children’s hospitals or pediatric units within academic medical centres. There is significant cross-border exchange between Canada and the United States with respect to both training and practice of pediatric surgery, linking to some extent workforce issues in both countries [1]. Similar to the situation in the United States, new Canadian training programs have emerged in the last decade. The potential currently exists to train fourteen new pediatric surgeons in Canada every two-year cycle. At the same time, there is little data on the clinical productivity of pediatric surgeons in active clinical practice in Canada. The list was obtained from the CAPS website, and verified by the Secretary-Treasurer. Data on demographics, training, current practice characteristics, future intentions (e.g. moving, retiring), practice volume, practice growth potential, and available resources were collected. The survey took place during March and April, 2012.

The first survey was sent to all active CAPS members, defined as pediatric surgeons in active clinical practice in Canada. The list was obtained from the CAPS website, and verified by the Secretary-Treasurer. Data on demographics, training, current practice characteristics, future intentions (e.g. moving, retiring), practice volume, practice growth potential, and available resources were collected. The survey took place during March and April, 2012.

The second survey was sent to the 18 surgeons serving as pediatric surgery division chiefs. The list was obtained from the Secretary-Treasurer and verified by the President of CAPS. The survey recruited information on division surgical volume, division manpower, current practice characteristics, future intentions (e.g. moving, retiring), practice volume, practice growth potential, and available resources were collected. The last 8 questions of the survey were directed only to the pediatric surgeons who served as division chiefs.

Results: The survey was completed by 98% of practicing surgeons and 13 of the 18 division chiefs. Only 6% of surgeons are older than 60 years, and only a fifth anticipate retirement over the next decade. The workforce is stable, with 82% of surgeons unlikely to change current positions. Surgical volume showed essentially no growth during the 5-year period 2006–2010. The majority of surgeons felt they were performing the right number or too few cases and anticipated minimal or no future growth in their individual practices or that of their group. Based on anticipated vacancies, the best estimate is a need for 20 new pediatric surgeons over the next decade. This need is significantly surpassed by the current output from the Canadian training programs.

Conclusions: The Canadian pediatric surgery workforce is currently saturated. The mismatch between the number of graduating trainees and the available positions over the next decade has significant repercussions for current surgery and pediatric surgery residents wishing to practice in Canada.
8 chiefs of divisions with training programs. The questions sought to assess work opportunities for prior and future pediatric surgery graduates from Canadian programs. The survey was administered in July and August, 2012.

The study was approved by the McGill University Faculty of Medicine Institutional Review Board, A08-E50-11B.

2. Results

2.1. Active CAPS members

2.1.1. Demographics

Sixty-two surgeons in active pediatric surgery practice in Canada were eligible for the survey. Of those, 61 (98%) responded. Sixty-one percent were males. The most common age group was 41–50 (41%), followed by 51–60 (36%), 30–40 (18%), and 61–70 (3%). Only one surgeon was over 70. The majority of responders (82%) completed their pediatric surgical training in Canada. Since starting pediatric surgical practice, 23% of surgeons had moved to Canada from the United States or another country. The most common reason cited for the move was a better quality of life. Since starting practice in Canada, 81% of all surgeons had not changed their original practice location. Surgeons were in their current position for a median of 12 years (range 1–33 years). Eighty-four percent of surgeons had full time academic appointments, while the remainder had volunteer or clinical medical school appointments. In terms of practice settings, 61% practiced in free-standing university children's hospitals, 23% practiced in academic children's hospitals within university medical centers, and 16% practiced in children's units within a teaching general hospital. The most common reimbursement mechanism was an alternative funding plan (54%), followed by mixed remuneration (26%), fee for service (10%), and salary (8%). The likelihood of moving to the United States or another country in 5 years and in 5–10 years was rated as unlikely or highly unlikely by 84% and 82%, respectively. Among those likely to move to the United States, the most common reason cited for an anticipated move was better financial compensation. The number of surgeons planning to retire within 5 years and in 5–10 years was 4 (7%) and 12 (20%), respectively.

2.1.2. Practice volumes

The responses to a number of questions evaluating individual practice volumes are shown in Table 1. In response to one's impression of overall practice volume, 69% of surgeons responded “just the right number of cases”, 18% responded “less cases than I would like”, and 13% responded “more cases than I would like.” When the same question was posed regarding major cases, the percent responding “less cases than I would like” doubled to 36%, while the percent responding “more cases than I would like” dropped by half to 6.6%. When asked to evaluate their division's workforce versus service volume, 72% felt there was just the right number of cases for the number of staff, 18% felt there were not enough cases for the number of staff, and only 10% felt there were too many cases for the number of staff. When asked to evaluate growth potential in their own practice, 64% felt there was minimal or no potential for growth in volume, acuity, or both, whereas 23% felt there was significant potential for growth in acuity and volume. When the same question was posed regarding the entire surgical service's growth potential, the proportions were quite similar (66% and 25%).

2.1.3. Resources

Surgeons were asked to evaluate the resources available to them for patient care. A majority, 54%, felt they had too little operating room time, while 46% felt they had just enough. When asked to evaluate their waiting list, 72% felt their waiting list was acceptable, 13% felt it was unacceptable, and 15% had no significant waiting list. Inpatient hospital resources (ICU beds, floor beds, etc.) were evaluated as too little by 61% of surgeons, and 70% of those felt that a 30–50% increase in inpatient resources was necessary for adequate care. Outpatient resources were felt to be adequate by 62% of respondents. The most common deficiencies noted in outpatient resources were clinic space (78%) and nursing staff (74%).

2.1.4. Career and income stability

A large majority of surgeons (80%) felt their income would be stable or extremely stable over the following five years, and an even greater majority (95%) had similar impressions of their overall career stability. When asked to rate their involvement in local, regional, or national health care policy matters, 38% were not involved, 30% were intermittently involved, 20% were continuously involved, and 12% were highly involved. Fifty-nine percent of pediatric surgeons supported the Canadian Medical Association's call for a transformation of the Canadian health care system, 30% did not feel a transformation was needed, and 11% had no opinion. In terms of the impact of a possible transformation on their careers, 50% felt that it would be positive, 22% felt that it would be negative, and 28% felt that it would be neither.

2.2. Division chiefs

2.2.1. Surgical volume

Thirteen of the 18 Canadian pediatric surgery division chiefs responded to the second survey. The thirteen divisions represented 55 pediatric surgeons or 89% of the workforce. The five division chiefs who did not respond therefore comprised the smallest divisions of one or two surgeons per division. Two divisions did not report surgical volume and one reported the combined volume of all pediatric surgical subspecialties. The 10 remaining divisions reported a median 2010 volume of 1390 cases (range 250–1941). There were essentially no significant changes in volume per division during the period 2006–2010. Eight chiefs reported that the surgical volume was appropriate for the number of staff surgeons, while two reported that the volume was too much, and three reported that the volume was too little. While 42% of chiefs felt there was no competition from nearby pediatric surgical services, 33% felt there was some, and 25% felt there was significant competition from such services. None of the chiefs reported significant competition from general surgeons in their community. Ten division chiefs anticipated a 10% increase in volume by 2015, two anticipated possible decline, and one anticipated a 30% increase. When the same question was posed for 2020, 7 anticipated a 10% increase, 5 anticipated a 30% increase, and one anticipated a 50% increase. When asked about potential growth, six chiefs anticipated significant potential for growth in acuity and volume, 4 anticipated minimal growth, two anticipated growth in volume only, and one anticipated increase in acuity only.

<table>
<thead>
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<th>Table 1</th>
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<td>Self-reported assessment of individual practice volumes (numbers indicate percentage of responders in each category).</td>
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<tr>
<td>The total number of cases I perform each year is:</td>
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<tr>
<td>The number of emergency cases (within 24 hours of admission) I perform each year is:</td>
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<tr>
<td>The number of neonatal index cases (not including hernia, lines) I perform each year is:</td>
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<tr>
<td>The number of major tumor resections I perform each year is:</td>
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<tr>
<td>The number of major elective cases (e.g. fundoplication, bowel resection for IBD, lung resection) I perform each year is:</td>
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2.2.2. Workforce

Twenty-one new pediatric surgeons had been hired in the 13 divisions over the previous five years, with a median of 1 and a range of 1–3 per division. Twelve of the new hires (57%) were new graduates. The other 9 surgeons all moved to Canada from the United States. Ten total vacancies were anticipated over the next five years, six owing to retirement, and four owing to surgeons moving to the United States or other Canadian centers. Chiefs anticipated hiring 22 surgeons over the next 10 years if only retiring surgeons were replaced, 20 of whom would be new graduates. Six of the 13 chiefs felt that hiring new surgeons would result in decreased compensation for each surgeon, but 70% of all chiefs felt that this would be acceptable to the majority of surgeons in the group. Only 31% of division chiefs had control over their staff’s compensation, and only 23% used a specific formula to reward clinical, research, or teaching productivity. Eleven of the 13 chiefs felt that their surgeons were satisfied with their income levels. Chiefs identified 23 current Canadian general surgery residents, not including foreign trainees, intending to pursue pediatric surgical training.

2.3. Chiefs with training programs

Seven of the eight division chiefs with pediatric surgery training programs responded to their component of the survey. Of 76 graduates during the previous 10 years, 45% were Canadian general surgery graduates, 24% were Americans who completed general surgery training in the United States, 5% were Canadians who completed general surgery training in the United States, and 26% were non-US, non-Canadian citizens, most of whom completed general and pediatric surgery training in Canada prior to returning to their home countries. Practice information was available for 67 of the 76 trainees. Forty percent were practicing in the United States, 27% were practicing in Canada, and 33% were practicing outside North America. Over the previous 10 years, 3 of the 7 chiefs were aware of six Canadian pediatric surgery graduates who wanted to stay in Canada but moved to the US owing to lack of Canadian positions. Of 22 current and already matched fellows (i.e. 3 years) in the 7 programs, 45% were graduates of Canadian general surgery programs, 5% were Canadian graduates of American general surgery programs, 27% were American graduates of American general surgery programs, and 18% were foreign graduates. Chiefs believed that all 10 current and already matched Canadian general surgery graduates would prefer to practice pediatric surgery in Canada. When asked to give their opinion as to how many new pediatric surgeons Canada needs per two year cycle, the division chiefs provided a wide range of 2–10, with an average of 5.7.

3. Discussion

This study constitutes the first detailed analysis of the Canadian pediatric surgery workforce, and the nature of Canadian pediatric surgery practices. In fact, the authors are aware of only one other study that attempted to shed light on the same subject [2]. In 1997, Bouchard and Laberge published a survey of CAPS members that included 35 surgeons practicing in Canada [2]. The survey had a 70% response rate and most results were not stratified by country. Nevertheless, it appeared at the time that Canadian surgeons were working fewer hours than those in the United States, and that approximately 30% were interested in decreasing their volume of practice over the ensuing five years [2].

This study paints a realistic picture of the current Canadian pediatric surgery workforce. The workforce is relatively young, with close to 60% of active surgeons less than 50 years of age. It is quite stable. A large majority of surgeons have not changed their practice location. Canadian pediatric surgical practice has remained almost purely academic, largely concentrated in free-standing children’s hospitals and university medical centers. A large degree of confidence regarding income levels and overall career stability exists. Self-reported practice volumes are adequate for most surgeons, but the volumes of surgical oncology and neonatal index cases are rated as low by approximately one-half and one-third of pediatric surgeons, respectively. Very few surgeons believe they are performing too many cases. A majority do not believe there is much potential for growth either in their own practices or that of their group. Available resources are unlikely to easily accommodate additional practices. Surgeons’ impressions are supported by the numbers, which have essentially shown little or no increase in case volumes over the years 2006–2010. It should be noted that there is no objective way to measure overall clinical productivity in Canada, similar to the American relative value unit.

The survey of division chiefs was mostly consistent with individual surgeons’ responses. The majority of chiefs felt that the surgical volume was adequate or low for the number of staff. Modest increases in volume, 10–30%, were anticipated through 2020 by division chiefs. Even these levels may be optimistic. They are largely unsupported by 2006–2010 data. Furthermore, while the number of pediatric surgeons in Canada has increased by almost 30% over the last decade, the population growth rate has been a steady 1.0–1.2% annually [3]. In addition, owing to the tertiary nature of most Canadian pediatric surgery practices, several common procedures, such as tunneled central venous catheter placements and gastrostomies, have been gradually migrated to other departments in many centres. Competition from urologists, otolaryngologists, and others for common pediatric surgical cases is likely to continue.

In contrast to the Canadian situation, there has been significant attention paid to the American pediatric surgical workforce, starting with work by O’Neill et al [1,4]. Building on this work, multiple pediatric surgery workforce studies have been published in the United States during the last decade [5–10]. An understanding of the American pediatric surgery workforce is quite pertinent to Canadian pediatric surgery, since there is significant cross-border exchange of trainees and practitioners. Three American pediatric surgeons currently practice in Canada (5% of the workforce), and recruitment of senior pediatric surgeons to Canadian positions is often open to Americans and others. At the same time, as we demonstrated, Canadian programs continue to train Americans each year, who typically return to the United States upon completion of training. Canadian pediatric surgeons also often seek American positions, in some cases owing to lack of Canadian opportunities. This relationship has been mutually beneficial, giving Canadian pediatric surgeons more options while helping to address a significant deficit in the American pediatric surgery workforce that shows no signs of resolution in the near future [5–9]. This mutual interdependence stands in contrast to other specialties facing a shortage of Canadian positions, such as cardiac surgery and thoracic surgery, where Canadians are not able to obtain American certification, resulting in significant underemployment of Canadian surgeons in those specialties [11–13].

Significant differences exist between American and Canadian pediatric surgery practices, despite the similarities in training. The strong American market for pediatric surgeons has been sustained by migration of surgeons from traditional academic and free-standing children’s hospital settings to community hospitals that provide pediatric surgical care of lower acuity [4–6]. For example, surveys of American pediatric surgical graduates published in 1999 and 2003 showed that, although incomes rose and all graduates were employed, only approximately one-third were able to find desired positions at university children’s hospitals [4,5]. New surgeons commonly cover multiple hospitals interested in retaining as many patients as possible [4,5,9]. This dilution of expertise has been of concern to the American Pediatric Surgical Association, which has issued position statements regarding best practices [14]. Salaried positions and heavy subsidies from hospitals to support pediatric surgical practices are routine [6,9].
In contrast, Canadian pediatric surgical practice has remained almost purely academic, essentially nonexistent outside teaching institutions. Surgeons have remained financially independent, and typically do not receive any salaries or subsidies from hospitals. This is the environment that most Canadian pediatric surgeons also experience during their training. As was seen in our survey of chiefs with training programs, the majority of Canadian trainees would like to stay in Canada. Many may be uncomfortable with the community model of pediatric surgery common in the United States. Several have accepted American positions in order to avoid unemployment or underemployment.

The Canadian pediatric surgery workforce appears saturated at the present time. Our best estimate, given the data gathered here, is a need of 20 new pediatric surgeons in Canada over the next decade, an average of two per year. Increases above that level might lead to further dilution of pediatric surgical expertise per surgeon and some decline in income. Seven pediatric surgery divisions with training programs identified 23 current Canadian general surgery residents interested in pediatric surgery. Although many of these residents may eventually decide not to pursue pediatric surgery, there are probably others in the rest of the country, as well as future students and residents who may develop an interest in pediatric surgery over the next decade. It is difficult to accurately predict the potential supply of Canadian pediatric surgery trainees, but it is likely that there will be a mismatch between the number of graduating trainees and the available positions over the next decade in Canada. While new trainees should not be discouraged from pursuing pediatric surgery, they should be appropriately mentored regarding workforce issues as part of their decision-making process.

This study also has significant implications for Canadian pediatric surgery training programs, who are clearly training more surgeons than needed for Canada. The availability of Americans and foreign nationals has consistently acted as additional sources of trainees, and allowed Canadian programs to produce well-trained pediatric surgeons who practice throughout North America, and in several other countries in need of such expertise. However, the consistent flow of these applicants is not secure, as American programs proliferate and fewer foreign-trained residents are accepted into Canadian general surgery programs. Cardiac surgery in Canada has experienced a significant drop in applications with many spots every year remaining unfilled [12,13]. This is unlikely to occur in pediatric surgery, but training programs should at least be alert to this potential situation. There does not appear to be a need for additional Canadian training programs at this time.

The limitations of this study, and any workforce study, should be clearly considered in the interpretation of our results. Surgical workforce predictions are an inexact science at best. For example, predictions by O’Neill in the 1980’s and 1990’s of a looming oversupply of pediatric surgeons have not been born out [4–8]. The survey methodology we used is common to many surgical workforce studies [2,4,5,8,9,15–17]. Many of these surveys relied on responses from new graduates in the specialty, a task not performed in the current study. Longitudinal surveys can enhance the validity of the data and its interpretation, and have sometimes resulted in very different conclusions from static point-in-time evaluations [18,19]. Population-based studies and temporal geocoding have also increased the accuracy of workforce evaluations [6,7]. Surgical volume data obtained from national databases, such as the American Nationwide Inpatient Sample database, can also shed light on the total volume of cases in a given specialty, and on the practitioners implicated in treating those diseases [20,21]. These methods have been successfully used to predict workforce needs in smaller surgical specialties such as endocrine or hepatobiliary surgery, and may be particularly pertinent to pediatric surgery [20,21]. All of these methods can certainly enhance future pediatric surgery workforce assessments in Canada and the United States.

In addition, a major assumption in the study is that future pediatric surgeons will share the career desires and work intensity of current ones. This was already challenged in 1997 [2]. In a survey of surgical residents and faculty members at two Canadian universities, Maruscak et al. recently reported that current trainees expect to adopt components of resident work-hour guidelines into their surgical practice [22]. They expect less frequent call responsibilities, fewer workdays, and limited postcall responsibilities, in addition to increased parental leave time [22]. Nonoperative clinical activities of pediatric surgeons may increase as the emphasis on multidisciplinary follow-up of congenital anomalies becomes standard practice. Finally, several pediatric surgeons in Canada have significant, and in some cases increasing, administrative, educational, or research commitments that may limit their clinical practice. Some have major commitments to global surgery and practice overseas.

Despite these limitations, our study suggests a currently saturated market for pediatric surgeons in Canada and a future supply of surgeons that surpasses the availability of new positions. A longitudinal assessment over the next decade can serve to evaluate how the multiple confounders discussed above, often difficult to measure, affect the workforce. It would also serve as a test for the predictions made in this study.

References