

Variability of the Pediatric Subspecialty Workforce in Canada

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Objective To assess the regional variability of the pediatric subspecialty workforce in the academic health science centers in Canada, because effective and efficient delivery of specialized pediatric health care depends on the pediatrician workforce.

Study design This was an analysis of the pediatric subspecialty workforce database of the Pediatric Chairs of Canada for the surveys obtained between 2003/04 and 2005/06.

Results In 2003/2004, 960 pediatrician specialists who spent a majority of their time supporting clinical, educational, research, and administrative activities within the 16 Canadian medical schools were reported. In 2004/05, this figure was 1044, and in 2005/06, it was 1140. The growth was due predominantly to increases in physician workforce in the fields of emergency medicine, respiratory medicine, and neonatology. The average academic pediatric workforce, excluding general pediatricians, increased from 12.86/100 000 child population in 2003/04 to 13.99 in 2004/05 and 15.27 in 2005/06. Substantial regional variability exists, with 4-fold differences in academic pediatrician workforce among the low-supply provinces (Saskatchewan, British Columbia, and Ontario) and high-supply provinces for both total workforce and subspecialists.

Conclusions The substantial variability in the supply of pediatric subspecialists across Canada requires additional analysis to determine any relationship to child health outcomes. (*J Pediatr* 2010;157:844-7).

Reports on the academic clinician subspecialist workforce in Canada are limited. In 1993, the 16 Paediatric Chairs of Canada (PCC; known as the Assembly of Canadian University Paediatric Department Heads until 2003) initiated an annual survey of academic pediatricians who practiced in their respective medical schools, and compiled an ongoing database.¹ Academic clinician subspecialists have to fill multiple roles, including clinical care, education at the undergraduate and postgraduate levels, and research from bench to bedside to community. There is little understanding of the number of specialists needed to fulfill these multiple roles.² Previous reports from PCC members focused on the various academic career paths,^{3,4} and were limited to a cross-sectional analysis. There also has been no detailed analysis by province and subspecialty.

In Canada, primary care for children is provided by general practitioners; the number of pediatricians is low, and approximately 50% of them work in the academic health science centers. Adult subspecialists provide a very small proportion of pediatric subspecialty care. Most of the pediatric subspecialists practice within academic health science centers. In view of the nationwide difficulties associated with access to pediatricians,⁵ and recent attempts to improve the pediatrician workforce in some provinces, we were interested in exploring whether the pediatric academic workforce has changed since 2003,⁴ as well as the regional distribution of physicians. Maldistribution refers to the mismatch between the spatial location of inhabitants and that of health care providers. Maldistribution of health care providers has been identified as one of the major challenges facing the health care workforce.

Methods

In the autumn of 2004, 2005, and 2006, Canadian medical schools reported the number of physicians working in their departments who were credentialed as a pediatrician or pediatric subspecialist by either the Royal College of Physicians and Surgeons of Canada or the Medical College of Québec, using consensus definitions of academic faculty.⁴ In brief, a physician had to have a status of at least 50% time spent in the academic institution. No adjustment was made for the full-time equivalent (FTE) count for part-time physicians. The reporting institution signed off and verified the data with electronic submission. No subsequent

AB	Alberta
BC	British Columbia
FTE	Full-time equivalent
MB	Manitoba
NF	Newfoundland
NS	Nova Scotia
ON	Ontario
PQ	Province of Québec
SK	Saskatchewan

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*List of Paediatric Chairs of Canada is available at www.jpeds.com (Appendix).

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data validation was performed. General pediatricians were excluded due to the substantial variability in the affiliations of general pediatricians among the various academic health science centers. Smaller subspecialties, such as allergists, nutritionists, and toxicologists were summarized under "other." Child psychiatrists are not organized under Departments of Pediatrics and thus were excluded.

To adjust the physician number by the population served, we calculated ratios of academic pediatricians per 100 000 child population (age <19 years). The populations were based on the Canadian census for 2001, released on April 8, 2004.⁶ The data analysis was performed directly from spreadsheets for each center. The four pediatric academic health centers in Québec were combined and reported as PQ (Province of Québec) physicians. Similarly, the five pediatric academic health centers in Ontario and the two centers in Alberta were combined and reported as ON physicians and AB physicians, respectively. Of note, the center in Halifax, Nova Scotia (NS), provides care for the other two Maritime provinces (New Brunswick and Prince Edward Island), and the child population denominator was calculated accordingly.

Statistical analysis was performed with simple statistical tests using Excel for Mac version 12.1.0 (Microsoft, Redmond, Washington) and GraphPad Prism version 4.02 for Mac (GraphPad Software, San Diego, California). Continuous data were analyzed for normal distributions with the Shapiro-Wilks test. Normally distributed data are reported as mean and standard deviation; otherwise, the 25th, 50th, and 75th percentiles and the minimum and maximum are reported. One-way analysis of variance for nonnormally distributed data (Friedman test) was used to compare the three periods 2003/04, 2004/05, and 2005/06.

Results

There were 960 pediatric subspecialists in 2003/04, 1044 in 2004/05, and 1140 in 2005/06. Consistent with provincial population distribution, ON had the largest number of physicians, followed by PQ, AB, and British Columbia (BC).

Since 2003, when 1109 pediatric academic physicians were reported (with general pediatricians included in that particular count),⁴ the pediatric academic workforce has grown moderately, to 1316 academic pediatricians in 2005/06 (including general pediatricians; data not shown). This is equivalent to an increase of 18.6%. BC, Saskatchewan (SK), Manitoba (MB) and Newfoundland (NF) were not part of this increase, whereas ON and PQ showed moderate increases of 7.7% and 5.7%, respectively. ON was the province with the greatest population growth (+750 236 between the 2001 census and the 2006 census;⁷ however, AB had the most significant increase in the pediatrician academic workforce (41.4%).

Based on the 2003 census, 7 464 853 children and adolescents age <18 years were used as the denominator. The average academic pediatric workforce, excluding general pediatricians, increased from 12.86/100 000 child population in 2003/04 to 13.99 in 2004/05 and 15.27 in 2005/06 ($P < .01$,

Friedman test). There was no correlation between a province's population and the concentration of academic pediatricians; 1 small, 1 medium-sized, and 1 large province were among the 3 provinces with the lowest number of academic pediatricians per 100 000 child population. SK (average 9.75 over the 3 years), BC (average 10.73 over the 3 years), and ON (average 11.70 over the 3 years) had the lowest numbers of academic pediatricians per 100 000 child population.

A comparison of the various subspecialties per 100 000 child population and by province revealed considerable regional variability (>3-fold difference between the lowest and highest number of physicians per 100 000 child population) in cardiology, critical care, developmental pediatrics, genetics, neonatology, nephrology, respiratory medicine, and rheumatology (Table I). Overall, there was a significant increase in subspecialists in the interval from 2003 to 2006 ($P < .01$, Friedman test), with persistent increases in child protection, emergency medicine, gastroenterology, hematology/oncology, neonatal medicine, respiratory medicine, and rheumatology (Table II).

Discussion

Overall, our data illustrate great variability in the distribution of specialized pediatricians in Canada. Compared with the distribution of the general population, Canadian physicians are more highly concentrated in urban areas; this is particularly so for specialists. Fewer than 16% of family physicians and only 2.4% of specialists are located in rural and small town Canada (using the Statistics Canada definition of rural), where 21.1% of the overall population resided in 2004.⁸ Importantly, our data refer to total number of physicians and not to FTEs. In addition, our data do not account for differences in clinical, research, and teaching activities among physicians, and thus, we could not perform a detailed analysis of differences in workload distribution between clinical, research and education activities. A typical distribution in clinical departments of pediatrics is 60%-70% clinical workload, 10%-20% research, and 10%-20% education; in our opinion, considering the teaching objectives and demands, this likely does not differ much across centers. Regardless, access to specialized pediatric services remains a challenge, with long waiting times.⁹⁻¹¹

The current study identified moderate growth in pediatric subspecialist numbers. However, as noted earlier, the overall increase of 18.6% from 2002/03 to 2005/06 is skewed by the very large increases in AB (41.4%). The data imply that the recent increases in medical school enrollment across the nation have not yet contributed to an increase in the pediatric academic workforce.

Compared with the United States and Europe, the Canadian pediatric workforce has shown moderate growth. In the United States, the total number of pediatricians in 2008/09 was 93 694 (with 18 949 serving as subspecialists),¹² compared with 51 675 in December 2001.¹³ Of note, the increase in the United States was much more prominent in the field of academic pediatrics.¹³ In Europe in 1999, a total of

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