

Are the career choices of paediatric residents meeting the needs of academic centres in Canada?

Bruno Piedboeuf MD FRCPC¹, Sarah Jones MD FRCPC², Elaine Orrbine³, Guido Filler MD PhD FRCPC⁴

B Piedboeuf, S Jones, E Orrbine, G Filler. Are the career choices of paediatric residents meeting the needs of academic centres in Canada? *Paediatr Child Health* 2012;17(1):17-20.

BACKGROUND: Responsibility for training paediatric medical subspecialists in Canada lies primarily with the 16 academic paediatric departments. There has been no mechanism to assess whether the number of residents in training will meet the needs of currently vacant positions and/or the predicted vacancies to be created by anticipated faculty retirement in the next five years across the different paediatric medical subspecialties.

HYPOTHESIS: At the present time, the training of the paediatric physician is not linked with the current and future needs of the academic centres where the vast majority of these paediatric subspecialists are employed.

METHODS: The academic paediatric workforce database of the Paediatric Chairs of Canada (PCC) for the surveys obtained in 2009/2010 were analyzed. Data included the number of physicians working in each subspecialty, the number of physicians 60 years of age or older, as well as the number of residents and their level of training.

RESULTS: There are some paediatric subspecialties in which the actual number of trainees exceeds the currently predicted need (eg, cardiology, critical care, hematology-oncology, nephrology, neurology, emergency medicine and genetic-metabolic). On the other hand, for other specialties (eg, adolescent medicine, developmental paediatrics, gastroenterology and neonatology), assuming there is no significant change to selection patterns, an important gap will persist or appear between the need and the available human resources.

CONCLUSION: The present analysis was the first attempt to link the clinical orientation of trainees with the needs of the academic centres where the vast majority of these paediatric subspecialists work.

Key Words: Human resource; Paediatric workforce; Specialists; Subspecialists

The specialized paediatrician workforce of subspecialists provides tertiary care for children and youth, and must be adequately trained and maintained so that supply meets the demand. Considerable resources and commitment are invested in training consultant general paediatricians and paediatric subspecialists, not only with respect to trainees and teachers, but also in terms of substantial health care dollars. A discrepancy between the projected needs in paediatric subspecialties and the residents' choices has been described in the United States (US) over the past decade (1). It is neither ethically or fiscally responsible to train individuals without knowledge of the workforce requirements. Consequently, it is important that attention be devoted to the predicted demands in the various subspecialties when offering training positions.

Les choix de carrière des résidents en pédiatrie répondent-ils aux besoins des centres universitaires du Canada?

HISTORIQUE : La responsabilité envers la formation des surspécialistes en pédiatrie au Canada repose principalement sur les 16 départements de pédiatrie universitaire. Il n'existe pas de mécanisme pour évaluer si le nombre de résidents en formation permettra de pourvoir les postes vacants ou dont on prévoit qu'ils le deviendront en raison des départs à la retraite anticipés d'ici cinq ans dans les diverses surspécialités de la pédiatrie.

HYPOTHÈSE : À l'heure actuelle, la formation du pédiatre n'est pas liée aux besoins actuels et futurs des centres universitaires, où la majorité de ces surspécialistes travaillent.

MÉTHODOLOGIE : Les auteurs ont analysé la base de données de la main-d'œuvre en pédiatrie universitaire des Directeurs de pédiatrie du Canada (DPC) contenant les enquêtes obtenues en 2009-2010. Les données incluaient le nombre de médecins qui travaillent dans chaque surspécialité, le nombre de médecins de 60 ans et plus ainsi que le nombre de résidents et leur niveau de formation.

RÉSULTATS : Dans certaines surspécialités de la pédiatrie, le nombre de stagiaires est supérieur aux besoins prévus (p. ex., cardiologie, soins intensifs, hématologie-oncologie, néphrologie, neurologie, urgentologie et génétique-métabolisme). Par contre, dans d'autres surspécialités (p. ex., médecine de l'adolescence, pédiatrie du développement, gastroentérologie et néonatalogie), s'il n'y a pas de modification importante aux profils de sélection, un écart important persistera ou fera son apparition entre les besoins et les effectifs disponibles.

CONCLUSION : C'est la première tentative pour relier les orientations cliniques des stagiaires aux besoins des centres universitaires, où la majorité de ces surspécialistes en pédiatrie travaillent.

The majority of paediatric specialties, including general paediatricians, originate from the training programs within each of our Canadian medical schools. Not all academic centres train all paediatric subspecialists. Some centres are heavily dependent on other academic centres to train subspecialists to meet their regional and/or provincial needs.

The responsibility for the training of all paediatric medical specialties in Canada lies primarily with the 16 academic paediatric departments. In their academic roles, the Chairs of these departments have the unique opportunity to influence the priorities of medical and resident trainees, their training programs and, ultimately, their career choices.

Since 1994, the Paediatric Chairs of Canada (PCC) have collected data on the paediatric academic workforce in Canada.

¹Department of Paediatrics, University Laval, Faculty of Medicine, Quebec City, Quebec; ²Department of Paediatrics, Queen's University, Kingston;

³Paediatric Chairs of Canada, Ottawa; ⁴Department of Paediatrics, Children's Hospital at London Health Sciences Centre, University of Western Ontario, London, Ontario

Correspondence: Dr Bruno Piedboeuf, Department of Paediatrics, Centre Hospitalier Universitaire de Québec, 2705 Boulevard Laurier, Québec, Québec G1V 4V2. Telephone 418-656-4141 ext 47574, fax 418-654-2771, e-mail bruno.piedboeuf@crchul.ulaval.ca

Accepted for publication July 26, 2011

TABLE 1
Evaluation of residency training versus predicted need

Discipline	Residents in training	Projected subspecialty needs*
Adolescent medicine	4	9
Allergy-immunology	9	14
Cardiology	20	14
Critical care	16	9
Developmental paediatrics	8	19
Emergency medicine	22	18
Endocrinology	9	14
Gastroenterology	10	20
Genetics and metabolic	30	19
Hematology-oncology	26	25
Infectious diseases	11	19
Neonatology	17	44
Nephrology	15	6
Neurology	38	21
Respiratory medicine	7	10
Rheumatology	9	10

Data presented as n. *Number of physicians needed in these areas based on the current capacity and projected faculty retirements

These data have included the number of active general academic paediatricians and paediatric subspecialists working in academic health centres, as well as the number of subspecialists trained by their respective departments. The definitions used within the database classify the current human resources in multiple capacities (eg, clinical, research and education/training), with an annual validation to ensure data integrity and reliability.

These unique data collected by PCC have resulted in three publications (2-4). Recently, additional variables have been added to the database to identify currently vacant positions, as well as the predicted vacancies to be created by anticipated faculty retirement.

Based on the 2009/2010 PCC Academic Workforce data, we conducted an analysis comparing the actual number of residents in training in each of the paediatric subspecialties against the predicted needs in these specialties across the 16 Canadian paediatric academic health centres.

METHODS

Using consensus definitions of academic faculty for 2009/2010 (5,6), the 16 PCC department chairs reported the verified number of physicians working in their departments who were credentialed as paediatricians or paediatric subspecialists by either the Royal College of Physicians and Surgeons of Canada (RCPSC) or the Collège des Médecins du Québec (CMQ).

Data on allergy and immunology, hematology-oncology, genetic and metabolic disease specialties were combined because they are part of the training programs approved by the RCPSC. Data were also collected for child protection and palliative care even though they are not RCPSC-approved programs. The department chairs were also asked to report the number of unfilled positions, as well as the number of individuals 60 years of age and older for each specialty. The instructions given to the Chairs specifically mentioned that the number of unfilled positions should not include the replacement for the physicians who were older than 59 years of age but not yet retired. No adjustments were made for departmental growth, and only funded and approved positions were included in the analysis. To calculate the combined number of vacancies and retirements within the next five years, a retirement age of 65 years was assumed and both numbers were added according to subspecialty.

The PCC reported the number of residents in each year of their paediatric subspecialty training programs as of July 1, 2009.

Eligibility criteria for reporting included the following: must hold an educational or practice license; must be in a subspecialty training program accredited by the RCPSC; and must be eligible to practice in Canada at the end of his/her residency. Data on international medical graduate residents not eligible for RCPSC examinations were reported separately and not included in the current analysis, because it was assumed that these foreign trainees would return to their home country. At the time of the survey, the length of training for general paediatrics was four years in every province except for Quebec, where the length of training was five years. For all except two paediatric specialties, which allow direct entry from medical school and have two routes to practice (neurology and genetics), the entry into a specialty residency program follows a minimum of three years of training in general paediatrics. However, some residents may elect to complete a fourth year (ie, to complete general paediatric training) before entry into a specialty. The length of genetics and neurology residencies is five years. The length of the other subspecialties, excluding the three years of general paediatric residency training, is three years for cardiology and haematology-oncology, and two years for the remaining subspecialties. The ramifications of different lengths of subspecialty training on availability for the job market, were not adjusted for in the present study. Because it was not possible to accurately assess the number of residents practicing general paediatrics from the PCC database, these numbers are not reported at this time.

RESULTS

The number of paediatric residents in subspecialty training and the respective predicted needs are summarized in Table 1. For some of the paediatric specialties, the number of residents in training is below the predicted need (eg, adolescent medicine, allergy-immunology, developmental paediatrics, endocrinology, gastroenterology, infectious diseases and respiratory medicine). However, for a number of specialties, the numbers of graduating residents will exceed the subspecialty requirements. For example, in hematology-oncology and cardiology, both of which are three-year training programs, the numbers of trainees exceed the need by 18% and 33%, respectively. For genetic and metabolic, a five-year training program, the numbers of trainees exceeds the need by 57%. In critical care, neurology and emergency medicine, the number of trainees is twice the predicted requirement. In nephrology, the actual number of trainees is three times the need.

For child protection, there are two residents in training for the projected five positions. For palliative care, there are three residents in training for only one projected position.

DISCUSSION

There is currently neither national paediatric subspecialist human resource planning, nor evidence available to guide health care authorities toward a needs-based distribution of paediatric subspecialists per 100,000 child population in Canada. The current distribution of paediatric subspecialists per 100,000 child population may also not be meaningful unless these data are linked to outcomes (4). However, despite this limitation, the current study was the first attempt to assess whether the number of residents in training will meet the needs of currently vacant positions, and/or the predicted vacancies to be created by anticipated faculty retirement in the next five years across the different paediatric medical specialties.

The present study had several other limitations. First, the analysis was based on the actual funded positions without any adjustments for current or projected population-based needs. Furthermore, it was impossible to account for Canadian residents completing subspecialty training in other countries. Some training abroad is encouraged, especially for an academic career, but

no system exists to track which residents are currently pursuing additional training in the US and/or elsewhere. In the same perspective, the data also do not account for the possibility that a trainee might extend his/her education with a research fellowship, clinician scientist training and/or an extra year of training after completion of his/her residency. Also, the predicted needs do not include the number of trainees who do not finish their training. A certain number of neonatologists, geneticists and developmental paediatricians work outside of the academic health science centres. In large urban areas, other subspecialists may work in the community, especially in the Greater Toronto (Ontario) Area. Furthermore, the variability in models of care is also an important determinant of the utilization of resources. Paediatricians do not work in isolation – the roles and deployment of nurses, family physicians, general paediatricians and paediatric specialists overlap. In addition, it is not clear that all models are equally effective in terms of their impact on health outcomes and economic efficiencies. Models of provision of care for children have not taken into account how changing technology with telehealth and e-consultation may change needs in certain areas, as well as change in the distribution of resources. Given the financial burden of the health care system on both provincial and federal governments, the impact of human resource distribution and utilization on child health outcomes will need to be addressed.

Second, the analysis assumed there would be no expansion in the number of subspecialists at any given centre or in population growth, albeit nationwide, there has been a considerable increase in the population of children and youth (7). The present analysis does not adjust for subspecialty-related factors that may modify practice and thus may result in changing needs for specialists in the future. As an example, the field of medical genetics is expanding and is no longer restricted to the paediatric and obstetrical populations. The area of genetic testing is changing quickly both in relation to those able to order tests and those able to interpret them, impacting the paediatric training landscape. In a number of academic centres, genetics is not part of the paediatric departments, which may lead to an additional underestimation of the need for geneticists. Furthermore, the presence of other health care professionals, such as genetic counsellors or neonatal nurse practitioners, may modify the need for physicians in certain subspecialties.

Third, there are also examples that may lead to a decreased need for subspecialists. Many centres have hired extensively from the US and abroad because of the specific skillset of the academic clinicians they required. It would be preferable to fill positions from the human resource pool in Canada. Clinical needs may also change. For instance, some provinces, such as Quebec, favour organ allocation to children, thereby significantly reducing the number of children on dialysis (8). It is unclear whether these trends can be offset by the increasing use of paediatric nephrologists to contend with obesity-associated hypertension (9) and the organ allocation issue may be minor. Moreover, certain trends, such as the increase of care of adolescents by paediatricians and palliative care physicians, were not accounted for (10). The long-term direction of these trends is difficult to predict and, therefore, could not be adjusted for in the current analysis.

In addition, the present study did not factor in the change in lifestyle and priorities of younger generations that are associated with a decrease in the number of work hours. This may be particularly true in some areas, such as emergency medicine, in which a number of young paediatricians would like to work part-time. It is also important to note that there is a preponderance of female residents in paediatrics, whereas the baby-boomer generation had a much larger proportion of male paediatricians (11).

On the other hand, in other areas, such as paediatric intensive care, the prediction of retirement at 65 years of age may not be accurate because a large number of physicians working in this area may shift their clinical focus to other areas of paediatrics, or education or administration before reaching retirement age because of health issues and the demanding work. Moreover, it is possible that large birthing centres with a level 2 neonatal unit may require additional neonatology positions because there is clearly an unbroken trend toward higher prematurity rates (12). In addition, the current analysis was unable to assess the predicted needs of paediatric specialists in large community hospitals because the data reported only on physicians in academic centres.

One emerging area, paediatric pharmacology, a RCPSC subspecialty that is offered only in very few centres, was not included in the analysis because of inconsistencies across the country. Although very few centres have a paediatric pharmacologist, this does not imply a lack of need. Many drugs are currently not licensed for use in children and Canada could play an important role in establishing evidence-based dosing of drugs in childhood, with appropriate attention devoted to ontogeny of drug disposition (13). Creating such capacity is vital in view of the recently renewed 'Best Pharmaceuticals for Children and Pediatric Research Equity Acts' in the US (14).

Because a large number of general paediatricians are working outside our paediatric academic centres, it is not possible to assess the need for the general paediatrician based solely on PCC data. In addition, there is no accurate database to assess the age distribution of general paediatricians in Canada. As well, the need for general paediatricians in community hospitals, and in the community, must be considered. Further studies are required to address these issues.

In a large country such as Canada, substantial regional variability exists, with fourfold differences in academic paediatrician human resources among the low-supply provinces and high-supply provinces, both for total human resources and for subspecialists (4). This substantial variability requires additional analysis.

As leaders of paediatric health care, the PCC and all paediatric department chairs have a social and moral responsibility to guide the future deployment of paediatricians based on the precise health care needs of this vulnerable population. Importantly, our data raise the question as to whether residency training programs should be counselling residents to make their choices on projected career needs or based on personal passion for a particular area.

THE DATA PRESENTED HERE REPRESENT THE COMBINED EFFORTS OF THE PCC MEMBERS: Dr Cathy Vardy, Memorial University of Newfoundland; Dr Wade Watson, Dalhousie University; Dr Bruno Piedboeuf, University of Laval; Dr Robert Brouillette, McGill University; Dr Marc Girard, University of Montreal; Dr Herve Walti, University of Sherbrooke; Dr David Mack, University of Ottawa; Dr Sarah Jones, Queen's University; Dr Denis Daneman, University of Toronto; Dr Lennox Huang, McMaster University; Dr Guido Filler, University of Western Ontario; Dr Cheryl Rockman-Greenberg, University of Manitoba; Dr William Bingham, University of Saskatchewan; Dr Jim Kellner, University of Calgary; Dr Susan Gilmour, University of Alberta; Dr Ralph Rothstein, University of British Columbia. The authors would also like to thank Debra Schleyer (PCC), Marion Williams (PCC), Pam Marples (Maternal, Infant, Child and Youth Research Network [MICRYN]), and Rhonda Rosychuk (Department of Paediatrics, University of Alberta and Women and Children's Health Research Institute, Edmonton) for their assistance in the collection and preparation of the data.

SOURCE OF FUNDING: This database was established through the Paediatric Chairs of Canada (PCC) and funded by its members. There was no specific funding for this analysis.

REFERENCES

1. Walker WA. A subspecialist's view of training and pediatric practice in the next millennium. *Pediatrics* 1998;102:636-44.
 2. Frewen T, Scott B. Paediatric Chairs of Canada: Academic paediatric workforce survey – report for the 1999/2000 academic year. *Paediatr Child Health* 2003;8:155-7.
 3. Scott B, Frewen T, O'Brodovich H. Paediatric Chairs of Canada: Academic paediatric workforce. *J Pediatr* 2004;145:425-6.
 4. Filler G, Piedboeuf B. Variability of the paediatric subspecialty workforce in Canada. *J Pediatr* 2010;157:844-7.
 5. Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among US children and adolescents, 1999-2000. *JAMA* 2002;288:1728-32.
 6. Strauss RS, Pollack HA. Epidemic increase in childhood overweight, 1986-1998. *JAMA* 2001;286:2845-8.
 7. Projected population by age, group and sex according to three projection scenarios for 2010, 2011, 2016, 2021, 2026, 2031 and 2036, at July 1 (2010) <<http://www40.statcan.ca/101/cst01/demo23a-eng.htm>> (Accessed February 23, 2011).
 8. Crafter SR, Bell L, Foster BJ. Balancing organ quality, HLA-matching, and waiting times: Impact of a pediatric priority allocation policy for deceased donor kidneys in Quebec. *Transplantation* 2007;83:1411-5.
 9. Filler G, Yasin A, Kesarwani P, Garg AX, Lindsay R, Sharma AP. Big mother or small baby: Which predicts hypertension? *J Clin Hypertens (Greenwich)* 2011;13:35-41.
 10. Freed GL, Dunham KM, Gebremariam A, Wheeler JR; Research Advisory Committee of the American Board of Pediatrics. Which pediatricians are providing care to America's children? An update on the trends and changes during the past 26 years. *J Pediatr* 2010;157:148-52.
 11. Freed GL, Dunham KM, Jones MD Jr, McGuinness GA, Althouse LA. Longitudinal assessment of the timing of career choice among pediatric residents. *Arch Pediatr Adolesc Med* 2010;164:961-4.
 12. Luu TM, Lefebvre F, Riley P, Infante-Rivard C. Continuing utilisation of specialised health services in extremely preterm infants. *Arch Dis Child Fetal Neonatal Ed* 2010;95:F320-5.
 13. Kearns GL, Abdel-Rahman SM, Alander SW, Blowey DL, Leeder JS, Kauffman RE. Developmental pharmacology – drug disposition, action, and therapy in infants and children. *N Engl J Med* 2003;349:1157-67.
 14. Wasserman R, Bocian A, Harris D, Slora E. Limited capacity in US pediatric drug trials: Qualitative analysis of expert interviews. *Paediatr Drugs* 2011;13:119-24.
-