

Family physician count and service provision in Ontario and Alberta between 2005/06 and 2017/18: a cross-sectional study

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Abstract

Background: Five million Canadians lack a family doctor or primary care team. Our goal was to examine trends over time in family physician workforce and service provision in Ontario and Alberta, with a view to informing policy discussions on primary care supply and delivery of services.

Methods: We used cross-sectional analyses in Ontario and Alberta for 2005/06, 2012/13 and 2017/18 to examine family physician provision of service days by provider demographic characteristics and geographic location. A service day was defined as 10 or more clinic visits worth \$20 or more on the same calendar day. We included all active family physicians who had evidence of billing in each fiscal year analyzed.

Results: From 2005/06 to 2017/18, the number of family physicians increased by 35.3% in Ontario and 48.7% in Alberta; however, annual average service days per physician declined by 10.6% in Ontario and 5.9% in Alberta. The average daily patient volume remained stable in Ontario and declined in Alberta, and services per population kept pace modestly with population growth in both provinces. Rural areas had the smallest increases in physician counts and largest declines in average annual service days per physician. Physicians in both provinces who had graduated from medical school at least 30 years earlier accounted for more than one-third of the workforce in 2017/18.

Interpretation: Ontario and Alberta experienced rapid growth in the number of family physicians, with the largest increases among those in late career and the lowest increases in rural areas. The decline in service provision among physicians overall and in subgroups in both provinces highlights the importance of measuring activity to inform workforce planning.

In Canada, there are serious concerns about the current and future supply of family physicians. Access to a family physician is not uniform across the country, particularly in rural communities. With an aging workforce of family physicians, greater representation of women, and an increasing preference for part-time practice and urban locations, many challenges lie ahead for health care planners and decision-makers. Determining the optimal number of family physicians is further complicated by an aging patient population with complex care needs.

In the past, provincial health ministries and regional health authorities relied on head counts and income-based units of full-time equivalents to estimate physician supply and physician–population ratios.^{1,2} In addition, voluntary national physician surveys provide general information on self-reported hours worked per week, but they remain cursory estimates of work intensity patterns and are unable to inform planning on a geographic basis. Important questions remain as to whether service provision has diminished per provider and per population while the supply of family phys-

ician has increased. The ability to accurately predict the trend of service provision remains an important issue for health care planners.

The aim of this collaborative work from researchers in Ontario and Alberta was to explore a new approach to estimating provision of primary care services to answer these questions. We hypothesized that the number of family physicians increased in both provinces between 2005/06 and 2017/18, but the amount of service provision by family physicians did not kept pace with the rate of population growth.

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Methods

Study population

All family physicians in active practice in Ontario and Alberta from Apr. 1, 2005, to Mar. 1, 2018, were included if they had any evidence of billing in the fiscal year analyzed. This included shadow billings in Ontario, as many family physicians in Ontario engage in this process. Shadow billing is defined as a record of services billed by but not paid to a provider; it pertains to those who are enrolled in payment methods other than fee for service (FFS). Fee for service is defined as payment received for each medical service provided to a patient; a record of every service paid for is maintained by the Ontario Ministry of Health for all providers and their patients.

In Alberta, the vast majority of family physicians (> 80%) bill on an FFS basis.³ A small number are paid by capitation or under contractual arrangements such as salary and sessional payments (most often in academic teaching centres or in Alberta Health Services facilities);⁴ that number remained small, with no substantive changes, throughout the study period. As such, shadow billings from family physicians in Alberta were excluded from our analysis, as they were unlikely to influence our results.

In Ontario, most family physicians work within organized groups who provide care to enrolled patients (i.e., patient enrolment model) and are paid via 3 main blended models of remuneration that include capitation and enhanced FFS.⁵

Data sources

For Ontario, data sets were linked by means of unique encoded identifiers and analyzed at ICES. ICES is an independent, nonprofit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyze health care and demographic data, without consent, for health system evaluation and improvement. The Ontario Health Insurance Plan (OHIP) claims database contains information on inpatient and outpatient services provided to Ontario residents eligible for the province's publicly funded health insurance system by FFS health care practitioners (family physicians) and "shadow billings" for those paid through non-FFS payment plans. The main data elements include patient and physician identifiers (coded), billing code for service provided, date of service, associated diagnosis and fee paid. We used OHIP billing data to determine the number of patient visits each family physician had on each day from Apr. 1, 2005, to Mar. 31, 2018. We defined a visit as 1 billing per patient per family physician per day. Billings with consultation locations of office, telephone, home, long-term care, inpatient ward and emergency department were included. Billings with "undefined" locations were excluded. We obtained information about physician demographic characteristics and practice location from the OHIP Corporate Provider Database and the ICES Physician Database.

For Alberta, Alberta Health family physician claims were linked to all outpatient community family physician clinic visits for the same period. The physician claims database was

used to determine the number of patient visits each year. Family physicians were identified as practitioners with more than 50% of their billing claims in each fiscal year among the following specialty codes: CMSP (Community Medicine – Specialty), GP (General Practice), GNMH (General Mental Health Physician), GEMD (Geriatric Medicine) or OCMD (General Practice). We used credential records from the College of Physicians and Surgeons of Alberta to identify provider sex, years since medical school graduation and country of medical school.

Billings with \$25 or more paid in Alberta and \$20 or more in Ontario (to account for differences in the provincial fees for a noncomplex visit) were included.^{6,7}

Geographic and population areas and populations

We used the postal codes of the family physician's practice address to determine geographic location in both Ontario and Alberta. In Alberta, we used practices in which the maximum number of claims occurred as the family physicians' clinics. There are differences in how geographic areas are defined and reported in Alberta compared to Ontario. For example, in Alberta, "metro" refers to 2 major metropolitan areas: Calgary and Edmonton. "Metro-influenced" areas are the suburban/commuter cities and towns surrounding Calgary and Edmonton. "Urban" are the 5 major urban centres with populations of 25 000 to less than 500 000: Fort McMurray, Grande Prairie, Lethbridge, Medicine Hat and Red Deer. The "urban-influenced" areas are the geographic areas surrounding these 5 urban centres.⁸ In Ontario, the geographic classifications from Statistics Canada are used. These are based on the census subdivision of the physicians' practice location postal code, grouped as census metropolitan areas (CMAs) or census agglomerations, or census subdivisions outside both. For example, urban is defined as "a CMA/census agglomeration with at least 10 000 but less than 100 000 population" where a physician's practice is located (Appendix 1, available at www.cmajopen.ca/content/11/6/E1102/suppl/DC1).⁹

Outcomes

Using a repeated cross-sectional design and provincial physician claims data from 2005/06 to 2018/19, we calculated the number of service days using a previously published service day methodology.¹⁰ This method defines a service day as 10 or more clinic visits with a value of \$20 or more on the same calendar day.

Statistical analysis

We completed a descriptive analysis for each of the family physician cohorts in Ontario and Alberta.

Ethics approval

For the Ontario analyses, the use of the data in this project is authorized under section 45 of Ontario's *Personal Health Information Protection Act* and does not require review by a research ethics board. For the Alberta analyses, approval was granted by the Conjoint Health Research Ethics Board, University of Calgary (REB17-1301).

Results

Physician characteristics

Physician characteristics, trends and comparisons are presented in Figure 1A and Figure 1B (see also Appendix 2, Table S1, available at www.cmajopen.ca/content/11/6/E1102/suppl/DC1). In Ontario, there were 8858 family physicians, or 7.1 per 10 000 population, in 2005/06, and 11 987 family physicians, or 8.5 per 10 000 population, in 2017/18. There were more male than female physicians over the study period, with a declining proportion overall. The proportion of the most experienced family physicians (≥ 30 yr since medical school graduation) grew over the study period, and the proportion of early-career physicians also grew substantially. Information on international medical graduates in Ontario was not available for the period examined.

In Alberta, there were 2716 family physicians, or 8.2 per 10 000 population, in 2005/06, and 4038 family physicians, or 9.5 per 10 000 population, in 2017/18 (Appendix 2, Table S1). There were more male than female family physicians over the study period, with a slight decline in proportion overall. The proportion of the most experienced family physicians increased from 25.2% in 2005/06 to 28.6% in 2017/18. In contrast, the proportion of early-career family physicians

remained relatively constant over the study period, whereas the proportion of international medical graduates increased from 36.2% to 48.7%.

Service provision

Figure 2 presents service provision findings, trends and comparisons. For both Alberta and Ontario, the average number of service days per year declined between 2005/06 and 2017/18, except for male and female physicians with 10–19 years of practice; the effect was very modest for male physicians with 20–29 years of practice (Appendix 2, Table S2). Alberta physicians had more service days on average than their Ontario counterparts. However, the average daily patient visit volume remained relatively steady in Ontario and declined slightly in Alberta over the study period. The average number of visits/services per population increased in both provinces between 2005/06 and 2017/18, from 3.4 to 3.5 per Ontarian and from 3.9 to 4.2 per Albertan (Appendix 2, Table S3).

In Ontario, the mean annual number of service days per provider declined by 18.1 over the study period (Figure 2). This translates to a decline in weekly average service days from 3.7 to 3.3 per provider over 46 weeks (Appendix 2, Table S3). This trend persisted across different daily patient volume cut-points (data not shown but available on request).

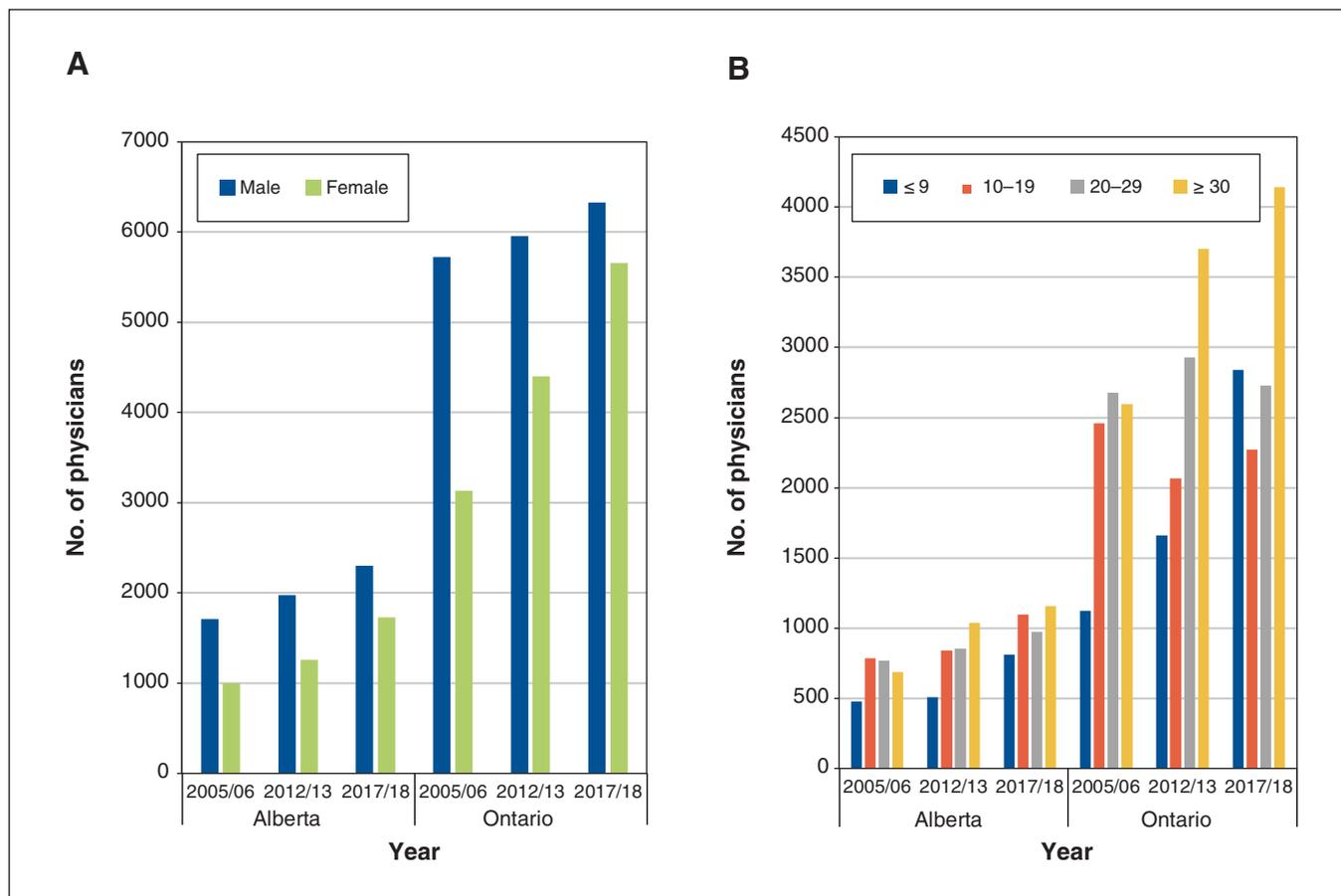


Figure 1: Number of family physicians by sex (A) and by years since medical school graduation (B), Alberta and Ontario, 2005/06, 2012/13, 2017/18.

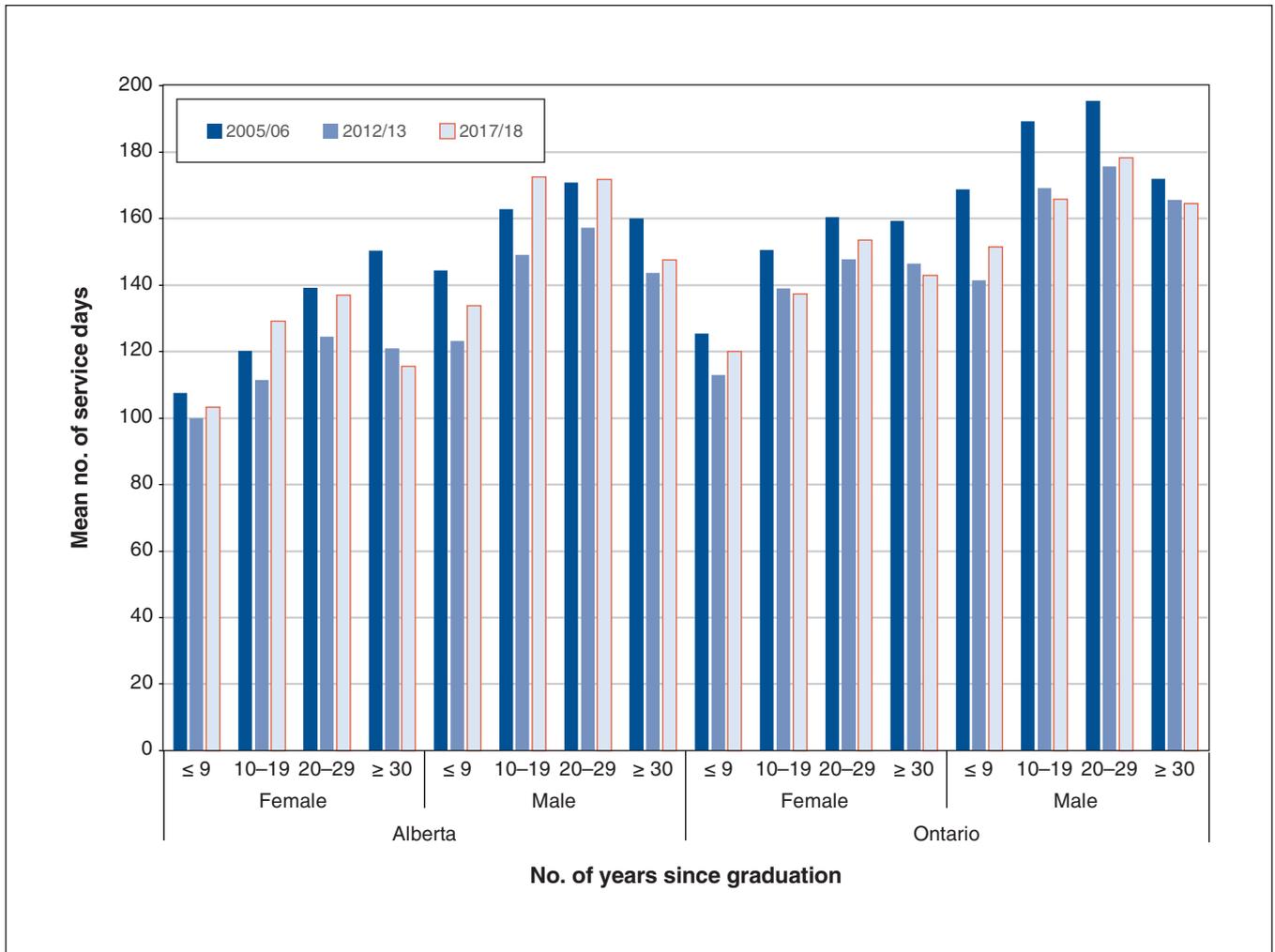


Figure 2: Mean number of service days (at least 10 patients) provided by family physicians in Alberta and Ontario, by sex and number of years since graduation, 2005/06, 2012/13 and 2017/18.

In Alberta, the total number of service days per provider declined by 13 between 2005/06 and 2017/18. Over a 46-week work year, the average number of service days declined from 3.9 to 3.7 per provider per week (Appendix 2, Table S3). This trend persisted across different daily patient volume cut-points (data not shown but available on request).

Service days by years of practice and sex

Years in practice

In both Alberta and Ontario, there was a gradient in service days per provider across years of experience, with more experienced physicians providing more service days. The decline in service days per provider was most pronounced among the most experienced physicians in Alberta and among early/mid-career physicians in Ontario (Figure 3; Appendix 2, Table S2).

Provider sex

Male family physicians worked more service days than female family physicians in both Alberta and Ontario. However, from 2005/06 to 2017/18, the average number of service days per

physician decreased for both male and female physicians, for almost all levels of experience (Appendix 2, Table S2). From 2005/06 to 2017/18, the most experienced female physicians reduced service days by 16.3 on average in Ontario and by 34.9 on average in Alberta, whereas their male counterparts reduced service days by 7.5 on average and 12.4 on average, respectively (Figure 3; Appendix 2, Table S2).

Practice location and population area served

The total number of family physicians meeting our inclusion criteria increased by 36.7% in Ontario and by 48.7% in Alberta over the study period, although average service days declined across almost all geographic locations (Figure 2; Appendix 2, Tables S4 and S5).

In Ontario, the relative increase in family physician count between 2005/06 and 2017/18 was most pronounced in urban centres and lowest in rural areas. The greatest increase, 43.1%, was in locations with a population of 10 000–100 000; however, average service days per physician in these areas declined by 17.4% (Figure 3; Appendix 2, Table S5). The next-greatest increase in physician count, 40.0%, was in an

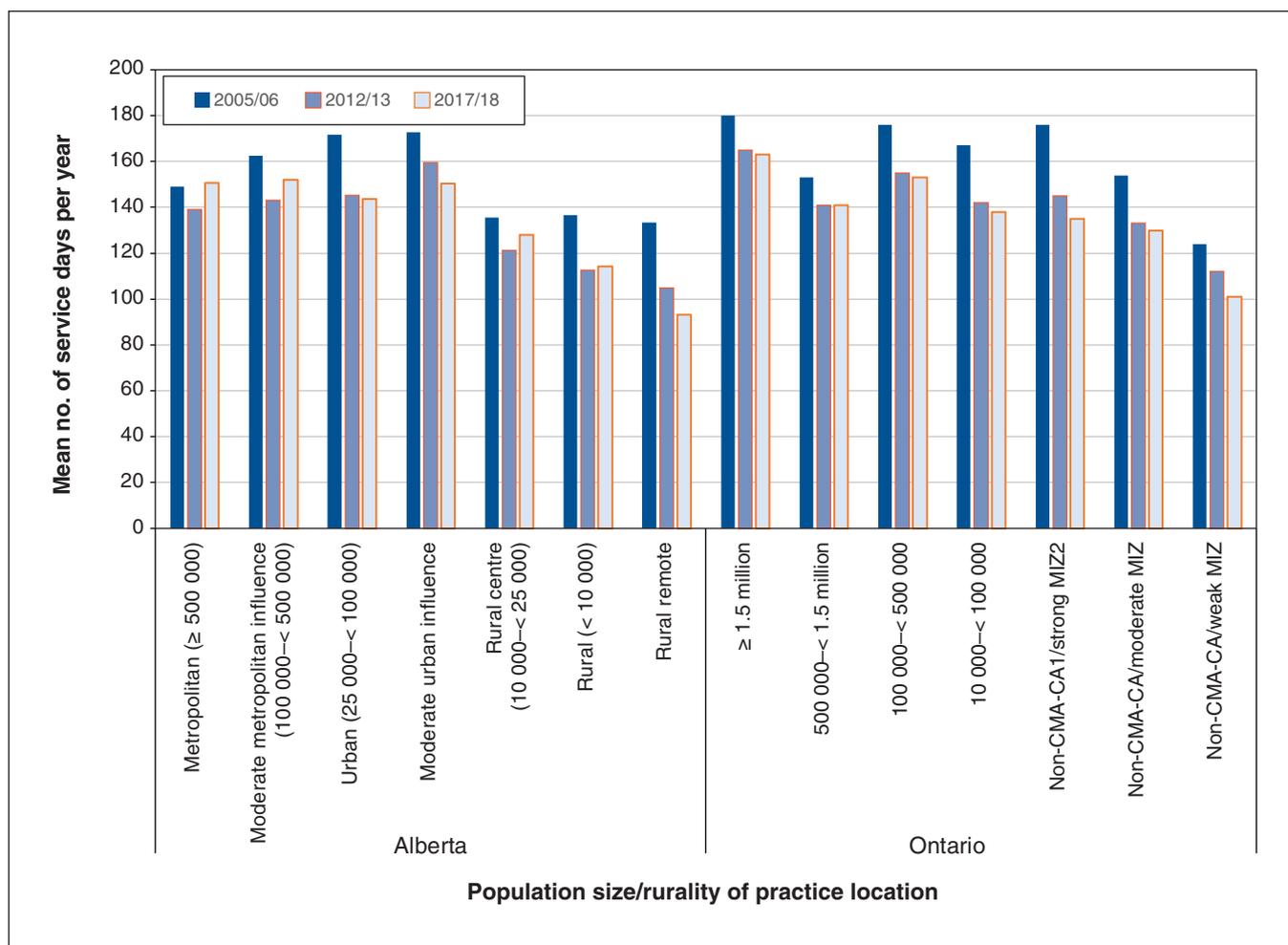


Figure 3: Mean number of service days (at least 10 patients) provided by family physicians in Alberta and Ontario, by population size or rurality of practice location, 2005/06, 2012/13 and 2017/18. CA = census agglomeration, CMA = census metropolitan area, MIZ = metropolitan-influenced zone. See Appendix 1 for definitions.

area with a population of more than 1.5 million (Toronto), whereas service days per physician in this area declined by 9.4% on average over the study period. In non-CMA/non-census agglomeration/weak metropolitan-influenced zones, physician counts increased by 20.7%, whereas service days per physician declined by 18.5% on average. Similar but less pronounced trends were seen across the remaining geographic areas (Figure 3; Appendix 2, Table S5).

In Alberta, the relative increase in family physician counts over the study period was also greater in urban centres and lower in rural areas. The largest increase, 99.6%, was in moderate metropolitan-influenced zones; however, average service days per physician declined by 4.5%. Physician counts in metropolitan areas increased by 49.1%, whereas service days per physician increased by only 1.1% on average. Notably, the lowest increase in physician count, 11.9%, was observed in rural remote areas, with a decline in average service days per physician of 30.0%. The remaining areas also had increased physician counts, by 23.0%–49.7%, whereas service days per physician decreased by 5.6%–16.7% on average (Figure 3; Appendix 2, Table S4).

Interpretation

This study aimed to explore trends over time in family physician workforce numbers by geographic area for more than 15 000 physicians in 2 populous Canadian provinces. The results offer an important perspective on both the supply and distribution of family physicians, and lend insight into the difficulty that health planners face with the paradoxical increase in the number of family physicians, an aging workforce, particularly in Alberta, and the challenges of keeping pace with service provision for growing populations.

We found a decline in service delivery broadly across levels of family physician experience and geographic locations in both provinces, with the total services per population barely keeping pace with the increase in population. These results are important for several reasons. From a geographic perspective, our results shed further light on the imbalance in family physician supply and distribution, and a trend toward providing fewer days of service. The reasons for this trend are multiple and complex, and may include the growing demand of electronic administrative tasks that family physicians face from direct patient care.

Over the past several decades, family physician demographic characteristics have changed considerably, including a growing proportion of family physicians providing less direct patient care.^{12,13} These findings should be interpreted in the context that a declining number of family physicians over time have opted for comprehensive practice, with many opting for focused roles in the emergency department or hospitalist service, as well as other ambulatory care settings.¹³ In Ontario, previous research showed that just over two-thirds of family physicians could be characterized as providing comprehensive care.¹⁴ Taken together, these findings suggest that the growth in the primary care physician workforce available to care for entire populations may be substantially overstated unless service provision, geographic distribution, career stage and comprehensiveness are taken into account.

Provider age and sex have been shown to influence the level of work intensity.¹⁵ Previous research has shown that female family physicians tend to report fewer work hours but spend more time with their patients than their male counterparts.^{16,17} The proportion of practising female family physicians increased from 2005/06 to 2017/18 in both Ontario and Alberta, and women provided fewer service days per physician than men; however, the downward trend over time was present for both sexes. Overall, our results align with a more recent Canadian study that showed an overall decline in clinical activity among family physicians.¹⁸

The amount of service provision in some family physician demographic categories, especially among younger physicians, may be a reflection of how they are paid, the amount of educational debt they carry and practice overhead costs.¹⁹ Ontario offers a broader choice than Alberta in payment models, including enhanced FFS and blended capitation, as well as team-based models of care, which are attractive for newer graduates.²⁰ In comparison, Alberta family physicians are paid predominantly by FFS, which incentivizes seeing a higher daily patient volume.³ Future work might focus on the preferences of family physicians in the model of care they choose to work in, such as the patient medical home, where multiple family physicians might cross-cover patient care and shared care with allied health care providers is a focus.

Limitations

Our analyses are limited to family physician billing claims in 2 provinces where billing codes and systems of reimbursement are different. The data provided by Alberta Health may have artificially inflated the number of family physicians, as pediatricians, as well as other physicians, provide some care under the same codes. Comparison of Alberta Health's data to those from the College of Physicians and Surgeons of Alberta in 2017/18, which we received directly from them and which represent a complete registry of licensed family physicians, indicates an overestimation by Alberta Health of about 700 family physicians in that year. The exclusion of shadow billings from the Alberta analysis did not affect our results, as few family physicians in that province engage in this process. From the Ontario analysis, services that appeared as shadow billings in the OHIP data were included or excluded based on

the standard price of the service provided. Geographic definitions were challenging to align in the 2 provinces, and some differences in definitions remained, so we reported each separately. Information on international medical graduates in Ontario was not available for the time periods examined. We could not include measures of complexity of care, need for primary care or unmet need, nor did we include measures of full-time and part-time practice, which we have reported elsewhere.¹⁰ Finally, given our inclusion criteria based on service provision, it is likely that a small number of physicians were included who had a limited or focused practice, and did not contribute toward provision of primary care services.

Conclusion

The total number of family physicians increased substantially in Ontario and Alberta between 2005/06 and 2017/18, but service days declined to varying degrees across all physician subgroups and geographic locations in both provinces. The declines differed by province and geographic area, and the data may overrepresent the true number of physicians available to provide comprehensive patient care. These results highlight important limitations in using physician counts for planning and suggest that service provision volumes may be more informative for understanding issues related to accessing care and workforce planning.

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Data sharing: The Ontario data set from this study is held securely in coded form at ICES. Although legal data-sharing agreements between ICES and data providers (e.g., health care organizations and government) prohibit ICES from making the data set publicly available, access may be granted to those who meet prespecified criteria for confidential access, available at <https://www.ices.on.ca/DAS> (email: das@ices.on.ca). The full data set creation plan and underlying analytic code are available from the authors on request, with the understanding that the computer programs may rely on coding templates or macros that are unique to ICES and are therefore either inaccessible or may require modification. The Alberta data sets are maintained by the Clinical Research Unit, Cumming School of Medicine, University of Calgary. Requests for the study data can be directed to Alberta Health.

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