RESEARCH PAPER

Productivity Decline or Administrative Avalanche? Examining Factors That Shape Changing Workloads in Primary Care

Baisse de productivité ou avalanche administrative? Examen des facteurs qui façonnent l'évolution des charges de travail en soins primaires

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Abstract

Background: In Canada, family physicians (FPs) per capita have increased but so have access challenges. We explored changes in population characteristics, service delivery and FP practice that may help understand these trends.

Methods: We used linked administrative data in British Columbia to describe changes in patient ages and comorbidities, hospitalizations and receipt of services that may require FP coordination, review and/or follow-up: prescriptions dispensed, laboratory tests, diagnostic imaging (radiology and ultrasound), specialist visits and emergency department visits. We estimate the number of FPs delivering community-based comprehensive care and report changes in service volume per community-based FP visit.

Results: Between 1999/2000 and 2017/2018, people experienced fewer days in hospital, but the number of treated comorbidities, day surgeries and other services requiring FP coordination increased over and above the expected levels attributed to population aging. While the total number of FPs per capita have increased, numbers in community-based care have not and visits per physician have fallen. Increases in services that may involve FP coordination per community-based FP visit ranged from 32.2% for diagnostic radiology to 122.1% for lab tests.

Conclusion: Findings suggest substantially increased coordination workload per FP visit. Ongoing impacts of population aging and changing service delivery on primary care workload require further examination.

Résumé

Contexte : Au Canada, le nombre de médecins de famille (MF) par habitant a augmenté, mais il y a des problèmes d'accès. Nous avons examiné les changements dans les caractéristiques de la population, la prestation des services et les pratiques des MF qui pourraient aider à comprendre ces tendances.

Méthode : Nous avons utilisé des données administratives couplées en Colombie-Britannique pour décrire les changements dans l'âge et la comorbidité des patients, les hospitalisations et les services qui peuvent nécessiter une coordination, un examen ou un suivi de la part du MF, à savoir, les ordonnances, les tests de laboratoire, l'imagerie diagnostique (radiologie et échographie), les consultations auprès des spécialistes et les visites aux urgences. Nous estimons le nombre de MF qui offrent des soins communautaires complets et signalons les changements dans le volume de services par visite chez le MF communautaire.

Résultats : Entre 1999/2000 et 2017/2018, les personnes ont passé moins de jours à l'hôpital, mais le nombre de comorbidités traitées, de chirurgies d'un jour et d'autres services qui nécessitent une coordination de la part du MF a augmenté au-delà des niveaux prévus attribués au vieillissement de la population. Bien que le nombre total de MF par habitant ait augmenté, la quantité de soins communautaires n'a pas augmenté et le nombre de visites par médecin a

diminué. L'augmentation des services pouvant nécessiter une coordination de la part du MF communautaire allait de 32,2 % pour la radiologie diagnostique à 122,1 % pour les tests de laboratoire.
Conclusion : Les constatations indiquent une augmentation substantielle de la charge de travail de coordination par visite chez le MF. Les répercussions continues du vieillissement de la population et de l'évolution de la prestation des services sur la charge de travail des soins primaires nécessitent un examen plus approfondi.

Introduction

Family physicians (FPs) and other primary care providers offer first-contact access to care and coordinate services received elsewhere. Despite an increasing per capita supply of FPs (CIHI 2021a), access to primary care remains a challenge for many patients (CIHI 2021b). This is, in part, explained by declining patient visits from FPs across all career stages (Rudoler et al. 2022). Declining visit volume has been observed in other specialties as well (Lee et al. 2021) and may reflect occupational and personal factors including changes in compensation, job satisfaction and responsibilities outside medicine. Yet, FPs are also reporting high levels of workplace stress (Sovran et al. 2020). Changes in the demands on FPs from patients and due to system factors could also be contributing to declining visits.

Population aging has been a topic of decades-long discussion in health services planning (Chappell and Hollander 2011). Due to the gradual nature of changes in population age, compression of morbidity and changes in care provision that reduce the length of resource-intensive hospital stays, it has largely been accepted that the impact of aging on health system demand may be modest relative to impacts of technologies and increased medical interventions (Barer et al. 1995; CIHI 2011; Chappell and Hollander 2011). However, a shift in services from hospital to the community may mean aging impacts primary care differently from the acute sector. While some related work has been done in other countries (Colwill et al. 2008; Petterson et al. 2012), there is a substantial gap in Canadian health workforce planning (Watson et al. 2005). In addition, changes in the medical management of chronic conditions that are more common in older ages may mean that the time and care processes (e.g., laboratory testing, prescribing, imaging and referrals) required to manage these chronic conditions have increased due to both aging and the increasing care interventions available for these chronic conditions (Adams et al. 2002; Korownyk et al. 2017; Mangin et al. 2007; Millar et al. 2018). Finally, FPs are playing new and needed roles within the health system, such as delivering hospitalist care, managing treatment for substance use disorders, working with mental health teams and filling other niches of focused practice (Kabir et al. 2021). These expanded roles for FPs outside of community-based comprehensive care have not yet been factored into primary care workforce planning.

The impact of population aging, complexity, the shift in care between hospital and the community, requirements for care coordination and new FP roles on visit volume at the

population level have not been explored in previous analyses of changing physician practice patterns (Lee et al. 2021; Rudoler et al. 2022). To better understand observations of declining visit volume, we conducted this secondary analysis as part of a broader study of changing physician practice patterns (Lavergne et al. 2019; Rudoler et al. 2022). We use population-based linked data to describe aging, the complexity of care and changes in patterns of service use within age groups over time. Our goal is to understand how these factors may affect the availability of patient visits with FPs offering comprehensive care. We focus on changes in service volume between hospital and community and the processes of care that require coordination, review and/or administration on the part of FPs. These indirect patient care activities require actions or reviewing the actions of other providers in the service of care and include managing prescriptions, lab tests, specialist visits and emergency department (ED) visits (Lee et al. 2021). We then describe the FP population, estimate the number of FPs likely to be delivering community-based comprehensive care and report on changes in service volume per community-based FP visit.

Methods

Study setting

We used primary care administrative data in the province of British Columbia (BC). Though there have been efforts to include more nurse practitioners in primary care, over the study period, primary care was almost exclusively delivered by FPs. In 2017/2018, a total of 327 nurse practitioners submitted shadow billings, which may reflect activity in primary care, representing only 1.15% of recorded patient contacts. Unlike other provinces, remuneration to physicians in BC remains almost entirely fee for service, with a small number of practices on alternate payment plans required to submit complete shadow-billing information. It is also possible to track prescriptions dispensed and lab tests performed in the community, for the complete population. BC, therefore, offers a unique opportunity to explore factors that may be driving changes in primary care workload.

Data

We use linked data accessed through Population Data BC covering all people registered for BC's provincial health insurance (Medical Services Plan [MSP]) and all FPs who submitted claims to MSP in 1999/2000 and 2017/2018. This includes data on all people registered for provincial health insurance (BC Ministry of Health 2019a); MSP payments to primary care physicians and specialists (including laboratory tests) (BC Ministry of Health 2019b); records of hospitalizations (CIHI 2019a) and ED visits (CIHI 2019b); and records of all prescriptions dispensed (BC Ministry of Health 2019c). Physician demographic and training information were obtained from the College of Physicians and Surgeons of BC (BC Ministry of Health 2018). Access to data provided by the data steward(s) is subject to approval but can be requested for research projects through the data steward(s) or their designated service

providers. All inferences, opinions and conclusions drawn in this publication are those of the author(s) and do not reflect the opinions or policies of the data steward(s).

Study population

We included all patients registered for MSP in the study years and all FPs licensed to bill under MSP. To include only fully trained FPs in active practice, we excluded those with fewer than 100 patient contacts within the year, who billed on fewer than 50 days, who had a missing year of graduation or who were less than two years from completing an MD.

PATIENT CHARACTERISTICS

Age was obtained from the BC MSP registration file. We used the Charlson Comorbidity Index (CCI) to measure the number of comorbidities (e.g., diabetes, heart failure, chronic obstructive pulmonary disease, liver disease, stroke, dementia) patients were treated for within each year. The CCI was generated using International Classification of Diseases [ICD]-9 and -10 CA codes from both outpatient and in-patient service use (Quan et al. 2011).

SERVICE USE

- *Hospitalizations*: We counted the number of discharges recorded in the discharge abstract database within each year for each patient, not counting hospital transfers. We also counted the number of days in hospital and the number of day surgery procedures.
- *Number of prescriptions dispensed*: We counted the number of different drugs dispensed per year, at the level of the first five digits of the Anatomical Therapeutic Chemical code. We excluded vaccines (J07), vitamins (A11), mineral supplements (A12), tonics (A13) and various (V) categories. We considered reporting both total prescriptions and only those ordered by FPs. We reported the total as FPs have a role in managing all prescriptions.
- *Laboratory tests*: We counted the lab tests ordered per patient (unique combinations of patient, fee item, date and ordering physician), excluding base fees, payable in addition to individual lab tests (MSP fee items 91000, 91005, 91010). As with prescriptions, we reported all laboratory tests as FPs have a role in monitoring results.
- *Imaging*: We counted imaging services per patient (unique combinations of patient, fee item and date) corresponding to diagnostic radiology (service code 90 excluding interventional radiology) and diagnostic ultrasound (service code 91). We excluded fee items billed on the same day as records of day surgeries. Imaging is not recorded in billing records if performed on in-patients.
- *Specialist physician visits*: We counted specialist visits as unique combinations of patient, provider and date, regardless of the number of fee items billed. We distinguish medical and surgical specialist visits based on claim specialty.
- *ED visits*: We counted MSP claims with a service location in the ED or corresponding to

fee items billed only in the ED (Peterson et al. 2021) or where a patient was hospitalized with entry via ED.

- *Ambulatory primary care visits:* We counted primary care visits as unique combinations of patient, provider and date, regardless of the number of fee items billed. We included visits in physicians' offices, homes, long-term care and synchronous virtual visits (available in BC since 2014). We excluded visits that took place in the ED or hospital, as well as visits related to opiate agonist treatment (fee item 00039) as these are high-frequency billings, and guidelines changed over the study period.

PHYSICIAN CHARACTERISTICS

We sought to distinguish between physicians in comprehensive community-based practice and those who practice mainly in other settings or focused practice areas. We classified physicians who had 80% or more of their visits in hospital or the ED or in specific service areas (surgical assistance, anesthesiology, perinatal care, mental health and substance use, cancer care and musculoskeletal/sports medicine) as *not* in comprehensive community practice. These physicians are described in the Appendix 1: Table A1 (available online at longwoods.com/content/27152). The choice of 80% was intended to reflect that FPs structure practice in different ways, and 80% allows for the situations where physicians practise a day or more per week in comprehensive care while doing other activities. To confirm this choice, we explored physician characteristics based on different thresholds (Appendix 1: Tables A2 and A3, available online at longwoods.com/content/27152). The majority of physicians classified as not in comprehensive community practice in our analysis actually have 90–100% of contacts in a focused practice setting or areas. This means changes in the threshold would not substantially change findings.

We described the characteristics of these two groups using data from the College of Physicians and Surgeons of BC and MSP billing data. Physician age, self-identified gender (though only binary options are provided), years since MD and location of MD training (Canadian vs. International Medical Graduate) were obtained from the College of Physicians and Surgeons of BC. An urban/rural practice setting was assigned based on the Statistics Canada metropolitan influence zone of residence for patients seen by an FP. Physicians are categorized as practising in an urban setting if the majority of their patient contacts were with patients from "zones 1–3" and in a "rural" setting if most contacts occurred in "zones 4–7" (Statistics Canada 2018).

ANALYSIS

We present mean services used and percentage changes between 1999/2000 and 2017/2018 by patient age group and summarize descriptive characteristics of community-based and other FPs in both years, reporting *n* (%) and mean (SD) as appropriate. We report changes in total service use across the whole population per capita and per community-based FP visit.

Results

The population has grown most rapidly in older age groups, with the percentage of the population ages 60 and older increasing by over 80% between 1999/2000 and 2017/2018 (Table 1). The average number of CCI comorbidities people are treated for increased over time in all age groups except for the age group of 0–19 years. The largest increase was among people aged 60–79 years (26.6%) and 80 years and older (58.7%). Both the number of hospitalizations and days in hospital declined over time across all age groups (Table 1).

TABLE 1. Percentage change in population and mean CCI comorbidities, hospitalizations and day surgeries between 1999/2000 and 2017/018 by age group

Population characteristics and service use	0–19	20–39	40–59	60–79	80+	Total
Population (*n*, %)						
1999/2000	1,059,509 (26.3)	1,172,139 (29.1)	1,108,947 (27.6)	554,617 (13.8)	126,217 (3.1)	4,021,429
2017/2018	1,060,012 (20.9)	1,378,338 (27.2)	1,401,213 (27.6)	1,007,383 (19.8)	228,405 (4.5)	5,075,351
Change %	0.0474%	17.6%	26.4%	81.6%	81.0%	26.2%
Comorbidities						
1999/2000	0.103	0.118	0.218	0.532	0.804	0.229
2017/2018	0.080	0.119	0.290	0.674	1.276	0.346
Change %	-21.8%	0.7%	33.0%	26.6%	58.7%	51.2%
Hospitalizations						
1999/2000	0.074	0.081	0.070	0.188	0.350	0.099
2017/2018	0.065	0.061	0.052	0.124	0.310	0.083
Change %	-12.3%	-24.7%	-24.9%	-33.8%	-11.4%	-16.1%
Days in hospital						
1999/2000	0.260	0.337	0.430	1.762	5.074	0.688
2017/2018	0.240	0.261	0.357	1.083	3.746	0.603
Change %	-7.5%	-22.8%	-17.2%	-38.6%	-26.2%	-12.3%
Day surgeries						
1999/2000	0.025	0.045	0.072	0.154	0.144	0.065
2017/2018	0.019	0.036	0.093	0.210	0.163	0.088
Change %	-21.5%	-19.8%	30.2%	35.7%	12.7%	35.8%

CCI = Charlson Comorbidity Index.

Day surgeries and prescriptions increased over time among people aged 40 years and older but declined among younger age groups (Table 2). Lab tests increased across all age groups but notably by 72.1% among people aged 40–59 years, 65.1% among people aged 60–79 years and 87.0% among people aged 80 years and older. Diagnostic radiology fell among people under 60 years, but increased by 33.8% among people aged 80 years and older. Diagnostic ultrasound increased among all age groups, but the greatest increases were among people aged 80 years and over (61.8%). Surgical specialist visits increased over time among people aged 40 years and older, and medical specialist and ED visits increased across all ages. Primary care visits have declined among all age groups, with the smallest declines among people aged 80 years and older (-3.7%).

TABLE 2. Mean service use and percentage change between 1999/2000 and 2017/2018 by age group

Service use	0–19	20–39	40–59	60–79	80+	Total
Prescriptions						
1999/2000	1.172	1.894	2.591	4.564	5.780	2.386
2017/2018	0.958	1.743	2.810	4.830	6.772	2.713
Change %	-18.3%	-8.0%	8.5%	5.8%	17.2%	13.7%
Lab tests						
1999/2000	1.338	3.665	5.487	10.234	10.446	4.673
2017/2018	1.787	5.624	9.441	16.897	19.536	8.740
Change %	33.6%	53.4%	72.1%	65.1%	87.0%	87.0%
Diagnostic radiology						
1999/2000	0.174	0.273	0.517	0.895	0.813	0.417
2017/2018	0.142	0.214	0.505	0.948	1.088	0.464
Change %	-18.8%	-21.6%	-2.4%	6.0%	33.8%	11.3%
Diagnostic ultrasound						
1999/2000	0.037	0.160	0.156	0.279	0.243	0.146
2017/2018	0.053	0.221	0.241	0.382	0.393	0.231
Change %	40.9%	38.1%	54.5%	36.7%	61.8%	58.6%
Medical specialist visits						
1999/2000	0.578	0.594	0.997	2.057	2.471	0.962
2017/2018	0.701	0.696	1.180	2.175	2.987	1.227
Change %	21.4%	17.1%	18.4%	5.7%	20.9%	27.7%
Surgical specialist visits						
1999/2000	0.280	0.614	0.786	1.777	2.041	0.779
2017/2018	0.242	0.581	0.858	1.933	2.415	0.938
Change %	-13.8%	-5.4%	9.1%	8.8%	18.3%	20.4%
ED visits						
1999/2000	0.320	0.287	0.229	0.336	0.677	0.299
2017/2018	0.339	0.361	0.341	0.444	0.860	0.390
Change %	6.0%	25.9%	48.7%	32.1%	27.1%	30.5%
FP visits						
1999/2000	3.131	4.158	4.635	7.033	8.246	4.544
2017/2018	2.150	2.967	3.847	5.706	7.945	3.807
Change %	-31.3%	-28.7%	-17.0%	-18.9%	-3.7%	-16.2%

ED = emergency department; FP = family physicians.

We identified a total of 4,330 FPs licensed to bill under MSP in 1999/2000 and 6,219 in 2017/2018. We excluded 529 in 1999/2000 (12.2%) and 578 (9.3%) in 2017/2018 because of exclusion criteria (low volume/missing year of graduation). Between 1999/2000 and 2017/2018, the total number of FPs per capita grew from 9.5 to 11.1 per 10,000 people in BC (Table 3).

TABLE 3. Characteristics of the BC FP workforce in 1999/2000 and 2017/2018

	Community-based physicians		Other FPs	
FP characteristics	**1999/2000**	**2017/2018**	**1999/2000**	**2017/2018**
Number of physicians (percentage of total within a year)	3,573 (94.0)	4,686 (83.1)	228 (6.0)	955 (16.9)
Physicians per 10,000 population	8.9	9.2	0.6	1.9
Physician characteristics (*n*, %)				
Years in practice				
<10	1,000 (28.0)	1,168 (24.9)	68 (29.8)	271 (28.4)
10–19	1,160 (32.5)	975 (20.8)	71 (31.1)	244 (25.5)
20–29	969 (27.1)	1,263 (27.0)	48 (21.1)	260 (27.2)
30+	444 (12.4)	1,280 (27.3)	41 (18.0)	180 (18.8)
Gender				
Women	1,081 (30.3)	2,072 (44.2)	43 (18.9)	336 (35.2)
Men	2,492 (69.7)	2,614 (55.8)	185 (81.1)	619 (64.8)
Urban/rural				
Urban (MIZ 1–3)	3,125 (87.5)	4,051 (86.4)	216 (94.7)	909 (95.2)
Rural (MIZ 4–7)	448 (12.5)	635 (13.6)	12 (5.3)	46 (4.8)
Location of MD				
Canada	2,675 (74.9)	2,939 (62.7)	188 (82.5)	778 (81.5)
International	837 (23.4)	1,635 (34.9)	33 (14.5)	154 (16.1)
Unknown location of MD	61 (1.7)	112 (2.4)	7 (3.1)	23 (2.4)
Service volume within year (mean [SD])				
Days billed	231.9 (64.3)	193.8 (62.7)	169.0 (60.8)	142.4 (47.6)
Unique patients seen in community	1,762.8 (1,086.0)	1,567.3 (1,196.1)	174.4 (328.9)	92.8 (265.4)
Community patient contacts	4,991.1 (2,679.8)	4,047.3 (2,752.5)	347.1 (959.6)	192.9 (662.7)
Community contacts per day billed*	23.0 (8.2)	21.5 (9.3)	5.3 (6.5)	7.9 (8.5)

BC = British Columbia; FP = family physician.
* Only days with community billings are included in the denominator.
Note: 69 other FPs in 1999/2000 and 555 other FPs in 2017/2018 have no days billed in the community and so are not included in this measure.

The number of comprehensive community-based physicians per capita increased only from 8.9 to 9.2 (as the percentage of total FPs fell from 94.0 to 83.1) (Table 3). The age distribution of FPs not working in comprehensive community-based practice also changed. In 2017/2018, a higher percentage of physicians who had been in practice for 20–29 years were not working in community-based practice, compared to 1999/2000. A higher percentage of physicians not in comprehensive community-based practice are men, though differences by physician gender narrowed over time as the percentage of women has increased in both

groups. Over time, higher percentages of physicians in comprehensive community-based practice have had international medical degrees. The percentage of physicians in rural settings has been largely stable. Between 1999/2000 and 2017/2018, the number of days billed fell for both physician groups, as did contacts and patients seen in the community for community-based physicians (Table 3).

Over the period from 1999/2000 to 2017/2018, the number of prescriptions, lab tests, imaging, specialist visits and ED visits per capita have all increased (Table 4). This ranged from an 11.3% increase for diagnostic radiology to an 87.0% increase for lab tests. This corresponds to increases in the volume of care processes requiring coordination per visit with FPs in comprehensive community-based practice ranging from 32.2% for diagnostic radiology to 122.1% for lab tests.

TABLE 4. Changes in service use requiring FP coordination between 1999/2000 and 2017/2018

Service use	Per capita	Per community-based FP visit
Prescriptions		
1999/2000	2.39	0.54
2017/2018	2.71	0.73
Change %	13.7	35.0
Lab tests		
1999/2000	4.67	1.05
2017/2018	8.74	2.34
Change %	87.0	122.1
Diagnostic radiology		
1999/2000	0.417	0.094
2017/2018	0.464	0.124
Change %	11.3	32.2
Diagnostic ultrasound		
1999/2000	0.146	0.033
2017/2018	0.231	0.062
Change %	58.6	88.4
Medical specialist visits		
1999/2000	0.96	0.22
2017/2018	1.23	0.33
Change %	27.6	51.6
Surgical specialist visits		
1999/2000	0.78	0.18
2017/2018	0.94	0.25
Change %	20.4	42.9
ED visits		
1999/2000	0.30	0.07
2017/2018	0.39	0.10
Change %	30.5	55.0

ED = emergency department; FP = family physician.

Discussion

The present study found that, over two decades, the population in BC aged and was treated for more comorbid conditions, while all community-based services requiring FP coordination, such as prescriptions, diagnostic imaging, lab testing and specialist visits, increased. While FPs per capita grew, the proportion in community-based practice fell and measures of service volume decreased. This is consistent with observations of reduced service volume among Canadian physicians documented elsewhere (Lee et al. 2021).

Our observation that adults are being treated for more chronic conditions may be driven by multiple factors. Whether increases in the prevalence of chronic conditions treated reflect changes in true prevalence or health status is unclear (McGrail et al. 2016). It may also reflect that treatments are now available for conditions that were not previously actively managed in primary care (e.g., attention deficit/hyperactivity disorder, hepatitis C), care options have become more numerous and complex (e.g., diabetes care) or there is less stigma in seeking care and, therefore, increased treated prevalence of disease (e.g., mental health disorders) (Childs 2005; McGrail et al. 2016). It is also possible that codes for chronic conditions are being more consistently reported as financial incentives tied to them have been introduced (Lavergne et al. 2016, 2018; McGrail et al. 2016). In addition, our findings underscore a reorientation of the healthcare system toward outpatient care, with hospitalizations falling across all ages and medical specialist visits, ultrasound and ED visits increasing across all ages.

Our findings are also consistent with the phenomenon of increased medicalization of aging as people aged 80 years and older are being treated for over 50% more conditions and have experienced the largest increases in prescription drugs dispensed, lab tests, imaging and specialist visits that are consistent with earlier findings (McGrail et al. 2011). Day surgeries, prescriptions, lab tests and surgical specialist visits increased among people aged 40 years and older, which is also the fastest growing age group within the population. This increased service use is over and above expected levels attributed to population aging and must be considered in planning for system capacity.

Regardless of the drivers of changing service use, increases in services delivered within the community that require FP coordination, oversight or monitoring would be consistent with an increase in FP time spent on both direct and indirect patient care per visit (Ladouceur 2022). The time required for indirect patient care may also be changing. For example, electronic medical records (EMRs) are associated with increased patient care quality and safety, but they have also added data entry tasks for clinicians and increased time spent on indirect patient care (Lee et al. 2021; Payne et al. 2015).

Over the same period, the physician workforce has changed. The number of FPs in community-based practice has plateaued, and the number of FP visits per capita has fallen. Examining physician practice patterns more closely, between 1999/2000 and 2017/2018, the number of days billed fell for both physician groups (Table 3). This may reflect choosing to work fewer days. It may also reflect time spent in other roles, including administration, leadership and research, which would not be reflected in billing data. Community contacts

billed per day increased slightly for physicians not in community practice, but this represents a small fraction of community contacts overall and likely reflects focused rather than comprehensive service delivery. We also note that the number of FPs in active practice based on our data (with 100+ patient contacts and 50+ billing days) is lower than the 6,721 FPs reported to be in BC according to data from the Canadian Institute for Health Information in 2018 (CIHI 2021a). This underscores the importance of analysis like this, which looks at the activity of FPs beyond head counts alone.

Falling visit volumes have previously been interpreted as declining productivity, pointing to evidence of a reverse wage-productivity gap because increasing compensation means physicians reduce service volume as they work to a target income (Lee et al. 2021). Our findings offer an additional explanation as changes in the population, patterns of service use and the FP workforce are consistent with increases in workload per primary care visit, including time spent on indirect patient care. Both explanations may operate simultaneously and are consistent with a shortage of primary care capacity.

Findings point to policy directions in the domains of primary care policy and workforce planning. Firstly, findings reinforce the need for primary care policies that ensure that capacity is aligned with population needs. This may include training more primary care providers, including FPs and nurse practitioners, but could also include organizational reforms that expand the implementation of team-based care models and interventions to streamline the administrative workload for primary care providers (The College of Family Physicians of Canada 2017). Of note, in BC, as in other jurisdictions, reforms described as team-based care include added additional providers (e.g., pharmacists or mental health service providers who can be referred to) within models where an FP still sees the patient, refers and receives reports (McKay et al. 2022). This may expand access to specific services, such as medication reviews or mental health services, but may not change the increasing work of indirect patient care or coordination within primary care. Models of care delivery that include team resources for coordination and indirect patient care are needed (Contandriopoulos et al. 2018). Others have also documented challenges in communication and patient information exchange with sites and providers outside their practices (Sovran et al. 2020). Strategies to both reduce workloads associated with patient coordination (i.e., streamlining specialist referrals and reporting of laboratory results) and develop systems of care where additional personnel support coordination work should be considered.

Secondly, findings underscore a need for more proactive and nuanced workforce planning that includes population aging, patient complexity and changing intensity of service use (over and above expected levels attributed to population aging) alongside physician practice patterns and workforce demographics to provide more accurate estimates of future need and capacity. Projections on the impact of population aging that do not take into account changing patterns of service use among older adults may dramatically underestimate future needs (Colwill et al. 2008; Madsen et al. 2002). The findings also point to the need to include information on the range of roles FPs are playing within health systems,

beyond community-based services. Many physicians may be working as hospitalists, in EDs or in providing care related to mental health and substance use, which respond to system and population needs. Redeploying this workforce would have consequences elsewhere, but these roles for FPs need to be planned proactively. This study complements other research pointing to the need to consider workforce demographics in planning (Rudoler et al. 2022). Taken together, the findings reinforce that provider-to-population ratios alone, particularly when limited to specialty designation without information on the type of practice, are flawed measures of workforce capacity.

A central limitation in this work is that we have no measures for hours worked related to coordination or indirect patient care or for other administrative processes, including practice management and documentation in EMRs. Regardless of the ability to measure time directly, given the substantial increase in the volume of these care processes, our findings underscore the point that strategies that streamline processes and reduce the time required for these activities will likely positively impact the time available for other primary care services. While we only examine two points in time, research examining shifts in visit volume reported elsewhere shows stable and consistent changes over this period (Rudoler et al. 2022). Changes in the compensation model recently announced in BC include an hourly payment, which if applied judiciously, offers new opportunities for future research that examines both work hours and visit volume.

Our data are limited to BC. However, the factors explored, notably population aging, changing comorbidity and changes in how medical care is delivered between hospital and community are not unique to BC. We expect findings to be transferrable to other jurisdictions in Canada and internationally. Our data do not include the COVID-19 pandemic and the accompanying widespread shift to virtual care. These have further strained primary care resources, and future research should examine workload changes in the context of the COVID-19 pandemic and ongoing mitigation. Our data include only FPs as nurse practitioners had limited roles in BC primary care within the study period. As findings describe changes in total primary care workload, they likely also apply to primary care providers without an FP designation. An 80% threshold for identifying physicians in community practice is arbitrary but is consistently applied in both years and does not impact observations of changes over time. This work does not directly estimate likely shortfalls in workforce capacity. Further research should explore how physician demographics, the range of roles FPs now play and changes to population service use can be included in health workforce planning.

Conclusion

Although visits per FP are falling, our observations of an aging population and a shift in service delivery from hospital to the community are consistent with increased workload per FP visit. Efforts to improve the efficiency of coordination work are needed. The future impacts of population aging on primary care workload may be substantial and require further examination.

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