

Family physicians providing regular care to residents in Ontario long-term care homes

Characteristics and practice patterns

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Abstract

Objective To describe the characteristics and practice patterns of family physicians who regularly treat long-term care (LTC) residents in order to inform quality improvement strategies.

Design Cross-sectional study involving a 2005 province-wide census of LTC residents' charts linked to additional health care administrative databases.

Setting All LTC homes in Ontario.

Participants Residents aged 66 years and older (n=50375) and the family physicians (n=1190) most responsible for their care.

Main outcome measures Distribution of LTC residents across family physicians, and physician demographic characteristics and practice patterns.

Results The distribution of residents across physicians was highly skewed (median 27 residents, mean 42.5 residents). The care of 90.4% of residents was accounted for by 628 (52.8%) identified physicians. Family physicians practising in LTC facilities were more likely to be older (mean age 52.4 years vs 48.2 years, $P < .001$) and male (82.4% vs 61.5%, $P < .001$) than other family physicians. Urban physicians who provided care to LTC residents had bigger LTC practices than rural LTC physicians did (median 50 residents vs median 12 residents).

Conclusion About 600 family physicians are responsible for the regular care of more than 90% of LTC residents in Ontario and quality improvement efforts could be aimed at this relatively small group of physicians. Half of the urban physicians who practise in LTC homes are responsible for 50 or more LTC residents. This might represent a key part of their overall practice.

EDITOR'S KEY POINTS

- Family physicians who regularly treat long-term care (LTC) residents are an important conduit for strategies related to appropriate medication use, because medication selection and prescription are directly under their control. Quality-of-care interventions directed at this selected group of health care providers might prove efficient, as there is the potential to affect a substantial number of LTC residents.
- A small number of family physicians are responsible for the care of a large percentage of Ontario LTC residents; the ratio varies by community size.
- The broader implications for how the concentration of care within a small pool of family physicians and the regional differences in their practice patterns affect overall quality of care for LTC residents requires further investigation.

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Médecins de famille qui traitent régulièrement des résidents de centres d'hébergement et de soins de longue durée en Ontario

Caractéristiques et modes de pratique

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Résumé

Objectif Décrire les caractéristiques et modes de pratique des médecins de famille qui traitent régulièrement des résidents de centres d'hébergement et de soins de longue durée (CHSLD) afin d'établir des stratégies pour améliorer la qualité des soins.

Type d'étude Étude transversale basée sur un recensement provincial des dossiers des résidents de CHSLD effectué en 2005 avec en outre, des bases de données administratives sur les soins de santé.

Contexte Tous les CHSLD de l'Ontario.

Participants Les résidents de 65 ans et plus (n=50 375) et les médecins de famille responsables de la plupart de leurs soins (n=1190).

Principaux paramètres à l'étude Répartition des résidents des CHSLD entre les médecins de famille et caractéristiques démographiques et modes de pratique des médecins.

Résultats La répartition des résidents entre les médecins était fortement asymétrique (médiane 27 résidents, moyenne 42,5 résidents). Les soins de 94,4% des résidents étaient fournis par 618 médecins identifiés (52,8%). Les médecins de famille pratiquant en CHSLD étaient plus susceptibles d'être plus âgés (âge moyen 52,4 vs 48,2 ans, $P < ,001$) et d'être des hommes (82,4 vs 61,5%, $P < ,001$) par rapport aux autres médecins de famille. Les médecins urbains qui suivaient des patients dans des CHSLD avaient plus de clients de ce type que les médecins ruraux (médianes 50 vs 12 résidents).

Conclusion Environ 600 médecins de famille sont responsables des soins courants de plus de 90 % des résidents de CHSLD en Ontario et les efforts visant une amélioration de la qualité des soins devraient porter principalement sur ce groupe relativement restreint de médecins. La moitié des médecins urbains qui pratiquent en CHSLD traitent 50 résidents ou plus, ce qui pourrait représenter une partie importante de leur clientèle.

POINTS DE REPÈRE DU RÉDACTEUR

- Les médecins de famille qui traitent régulièrement des résidents de centres d'hébergement et de soins de longue durée (CHSLD) sont une importante clientèle cible pour les stratégies relatives à l'usage approprié des médicaments, parce qu'ils sont directement responsables du choix et de la prescription des médicaments. Il serait probablement plus efficace de diriger les interventions visant l'amélioration des soins vers ce groupe particulier de dispensateurs de soins, puisque cela pourrait affecter un nombre important de résidents des CHSLD.
- Un nombre restreint de médecins de famille sont responsables de soigner un fort pourcentage de résidents des CHSLD de l'Ontario; le rapport médecins-résidents varie selon la taille des communautés.
- La façon dont la concentration des soins aux mains d'un groupe restreint de médecins et les différences régionales dans leurs modes de pratique peuvent affecter la qualité des soins des résidents des CHSLD mérite d'être davantage examinée.

Cet article a fait l'objet d'une révision par des pairs.
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The characteristics of the long-term care (LTC) setting—where frail residents with complex health concerns are cared for by multiple health care providers—generally make providing a high quality of care to residents both challenging and important. Currently, public reporting on the quality of care in LTC settings is expanding in many jurisdictions in Canada¹ and worldwide² and is accompanied by the development of interventions and processes intended to foster quality. While the overall care of residents rests within the multi-layered organizational structure of LTC facilities (including nursing staff, personal support workers, pharmacists, and other health care professionals) there are specific areas in which the role of the attending physician is particularly critical.³

In Canada, family physicians commonly provide care in LTC homes—although this practice varies according to the availability of other specialists, such as geriatricians, and the diffusion of other practice models, such as those involving nurse practitioners.⁴ Understanding the characteristics of family physicians who practise in LTC settings is important because of the commitment, training, and experience required to provide high-quality medical care in this setting.⁵ Appreciating who is providing care and the function that these individuals serve in LTC organizations is an important first step toward evaluating the quality of the processes under their control.⁶

For example, medication use is one area in which family physicians play an important role in LTC. Research continues to demonstrate high rates of inappropriate prescribing in the LTC setting,⁷⁻⁹ which places residents at risk of serious adverse events¹⁰ and can result in additional hospitalizations and, sometimes, death.¹¹ Family physicians who regularly treat LTC residents are an important conduit for quality improvement in this area because medication selection and prescription are directly under their control. In a commentary on LTC reform in the United Kingdom,¹² investigators suggested that the burden of responsibility for prescribing in the LTC setting often rests with general practitioners who might be undertrained for the intense specialist care that LTC residents often need. Conversely, others have suggested that family physicians are likely to have attitudes and skills well suited to caring for complex LTC residents and their families.¹³ In Ontario, a previous study found that 11% of family physicians participated in providing care to LTC residents in 1999, but this had decreased from 14% in 1990.¹⁴ Geography of practice was the most important predictor of LTC sector participation.

Despite the potential for substantial contribution by family physicians to quality improvement in LTC homes more broadly, and to medication management in particular, few studies have examined physicians who regularly treat LTC residents, and little has been documented about the characteristics of their practices. As more is

known about the family physicians who work in LTC settings, quality improvement plans can be designed to suit their needs and experiences. Therefore, we identified a population-based cohort of family physicians who cared for LTC residents in Ontario in 2005, described their demographic characteristics, and compared their practice patterns with those of family physicians not working in LTC settings. The objective of this study is to identify and characterize family physicians who regularly treat LTC residents in Ontario in order to inform quality improvement strategies.

METHODS

Data sources

Four population-based Ontario health administrative databases were linked to identify a prevalent cohort of LTC residents and the physicians who were most responsible for their care within the LTC setting. The Levels of Care Classification System database provided clinical and behavioural characteristics of residents from an annual census of all Ontario LTC residents between the months of September and November 2005. The Registered Persons Database provided demographic characteristics, while the Ontario Health Insurance Plan (OHIP) database provided information on physician claims data (including the location where the service was rendered). Using unique encrypted physician identifiers, we obtained physician characteristics (eg, age, sex, specialty, main community of practice, the number of claims, and total billings in different health care settings) from the Institute for Clinical Evaluative Sciences provider database. This study received approval from the Research Ethics Board of Sunnybrook Health Sciences Centre in Toronto, Ont.

Cohort construction

The study sample included all residents aged 66 and older living in eligible Ontario LTC homes who underwent a facility census in 2005 (baseline). Facilities were exempt from the census if they were newly opened (within the year) or preparing to close. Within facilities, individual residents might not have been assessed if they had been in the facility for less than 7 days, had died within the preceding 24 hours, or were in designated respite beds. To study family physicians with LTC contact, residents were required to have had at least 1 physician visit in the LTC setting in the 30 days before baseline; those without visits were excluded (n=10294). Thirty days allowed sufficient time for LTC residents to receive routine treatment while minimizing the potential for residents to be transferred between health care settings (as transfers are common in this setting). We also excluded residents newly admitted to LTC homes

within the 30 days before baseline (n=1907) to restrict the cohort to LTC residents who received most of their medical care in LTC facilities during the 30-day period. The final resident cohort consisted of 50375 older adults living in LTC homes.

Most responsible physician assignment

For each resident in the cohort, we determined the family physician most responsible for the care of that resident based on a set of LTC service billings representing routine services provided as per the OHIP Fee Schedule.¹⁵ These claims included routine monthly visits, nonemergency visits due to intercurrent disease, pre-dental or preoperative assessments, palliative care, and annual checkup visits (The OHIP fee codes for these claims are available from **CFPlus***). We focused on family physicians because preliminary analyses revealed that 91% of physicians who billed LTC services for the resident cohort belonged to this specialty. A physician was assigned as the most responsible physician (MRP) for an LTC resident if that physician had the highest frequency of LTC service billings. This algorithm was similar to one developed to assign MRPs to ambulatory patients with diabetes.¹⁶ In cases in which there was a tie (1.6%), physicians with lower encrypted identifiers were arbitrarily selected as the MRPs. The final MRP cohort consisted of 1190 family physicians.

Physician characteristics

Physician age, sex, rurality of practice as measured by the size of the main community served (<9000 population, 9000 to 99999, 100000 to 499999, 500000 to 1249999, and ≥1250000), place of medical training (Canadian medical graduate vs international medical graduate), practice patterns (number of obstetric deliveries, anesthesia payments, total number of annual visits in 2005, and the percentage of visits to LTC homes, emergency department, hospital, home, or office) were examined. Additional physician characteristics relating to LTC included the total number of LTC residents assigned to an MRP, the mean number of visits to an LTC resident per MRP, and the number of LTC homes attended to by an MRP.

Analysis

The characteristics of MRPs were compared with the remaining Ontario family physician population using χ^2 tests for categorical variables, 1-way analysis of variance for means, and Kruskal-Wallis tests for medians. Statistical significance was defined as $P < .05$. Characteristics and practice patterns of MRPs were

compared across different community sizes. To explore the distribution of LTC residents across MRPs, a Lorenz curve was plotted. The Lorenz curve is a function of the cumulative percentage of ordered individuals against the cumulative percentage of the outcome measured. In our case, MRPs were ordered by the increasing number of LTC residents under their care and the outcome measured was the total number of residents under their care.

RESULTS

Characteristics compared with other Ontario family physicians

Table 1 compares the characteristics and practice patterns of the MRPs with those of Ontario family physicians who were not assigned as MRPs. In general, MRPs were older than non-MRPs (mean 52.4 years vs 48.2 years, $P < .001$) and were more likely to be male (82.4% vs 61.3%, $P < .001$). The MRPs were also more likely to practise in rural areas compared with non-MRPs (24.4% vs 8.2%, $P < .001$) and were less likely to practise in the most populated urban areas (25.5% vs 44.4%, $P < .001$). Similarly, the practice patterns of the MRPs and the other family physicians differed. Specifically, the practices of the latter group consisted of mostly office visits (mean 87.1%) and had a negligible share of visits to LTC homes (mean 0.7%).

The number of LTC residents per MRP was highly skewed; the median number of residents cared for by MRPs was 27 (mean 42.5). On average, MRPs attended 1.5 LTC homes and visited their residents 2.6 times during the 30-day study period. On average, most of each MRP's practice was office-based (67.1%), with an additional 23.1% based in LTC homes, and 6.3% having family physicians. Correspondingly, urban MRPs did not practise as often in emergency departments (mean 0.9% vs 7.6%) and hospitals (mean 3.4% vs 8.8%). Urban MRPs were also less likely to perform obstetric deliveries (3.9% vs 20.7%) or receive anesthesia payment (9.2% vs 13.8%).

Lorenz curve

Figure 1 depicts the Lorenz curve, describing the distribution of LTC residents across MRPs. The bottom 47.2% (n=562) of MRPs (in terms of number of LTC residents per MRP) cared for 9.6% (n=4863) of all LTC residents. Conversely, the care of the remaining 90.4% (n=45512) of LTC residents was accounted for by the top 52.8% (n=628) of MRPs.

DISCUSSION

This is the first study to document the number and characteristics of family physicians who regularly treated LTC residents in Ontario. We identified 1190

*The **OHIP fee codes** are available at www.cfp.ca. Go to the full text of the article online, then click on **CFPlus** in the menu at the top right-hand side of the page.

Table 1. Characteristics of family physicians who regularly provided care to residents in LTC homes compared with all other family physicians in Ontario in 2005

CHARACTERISTICS	MRPs IN LTC HOMES (N = 1190)	REMAINING FPs (N = 9127)	P VALUE
Demographic characteristics			
• Age, y			
-Mean (SD)	52.4 (10.5)	48.2 (1.9)	<.001
-Median (IQR)	52 (45-59)	47 (39-56)	<.001
• Male sex, n (%)	980 (82.4)	5598 (61.3)	<.001
• Community size by no. of individuals, n (%)			
-< 9000	290 (24.4)	750 (8.2)	<.001
-9000-99 999	177 (14.9)	811 (8.9)	
-100 000-499 999	267 (22.4)	1986 (21.8)	
-500 000-1 249 999	149 (12.5)	1367 (15.0)	
-≥ 1 250 000	304 (25.5)	4055 (44.4)	
• Canadian medical graduate, n (%)	968 (81.3)	6943 (76.0)	<.001
Practice patterns			
• Total visits			
-Mean (SD)	7983.8 (4128.9)	5092.1 (3906.5)	<.001
-Median (IQR)	7366 (5227-10 253)	4474 (2166-7348)	<.001
• Percentage of practice made up of LTC home visits			
-Mean (SD)	23.1 (24.0)	0.7 (5.7)	<.001
-Median (IQR)	15.4 (3.6-35.3)	0 (0-0)	<.001
• Percentage of practice made up of office visits			
-Mean (SD)	67.1 (23.4)	87.1 (26.5)	<.001
-Median (IQR)	72.4 (55.3-84.7)	99.8 (90.6-100)	<.001
• Percentage of practice made up of emergency department visits			
-Mean (SD)	2.9 (7.8)	6.5 (21.1)	<.001
-Median (IQR)	0 (0-0)	0 (0-0)	<.001
• Percentage of practice made up of home visits			
-Mean (SD)	0.4 (1.2)	0.4 (4.0)	.982
-Median (IQR)	0.1 (0-0.4)	0 (0-0)	<.001
• Percentage of practice made up of hospital visits			
-Mean (SD)	6.3 (9.0)	5.2 (15.3)	.009
-Median (IQR)	3.2 (0-10.3)	0 (0-2.2)	<.001
• Number of obstetric deliveries			
-Mean (SD)	2.8 (11.0)	2.4 (12.2)	.313
-Median (IQR)	0 (0-0)	0 (0-0)	<.001
-At least 1 obstetric delivery, n (%)	135 (11.3)	691 (7.6)	<.001
• Anesthesia payment, \$			
-Mean (SD)	1527.0 (11 006.7)	2261.8 (26 169.0)	.338
-Median (IQR)	0 (0-0)	0 (0-0)	.068
-Any anesthesia payment, n (%)	100 (8.4)	636 (7.0)	<.001

IQR—interquartile range, LTC—long-term care, MRP—most responsible physician.

Table 2. Characteristics of family physicians who regularly provided care to residents in LTC homes stratified by community size in Ontario in 2005

PHYSICIAN CHARACTERISTICS	OVERALL (N = 1190)	POPULATION OF MAIN COMMUNITY SERVED				
		<9000 (N=290)	9000-99 999 (N=177)	100 000-499 999 (N=267)	500 000-1 249 999 (N=149)	≥1 250 000 (N=304)
Demographic characteristics						
• Male sex, n (%)	979 (82.3)	235 (81.0)	152 (85.9)	231 (86.5)	118 (79.2)	243 (79.9)
• Age, y, mean (SD)	52.4 (10.5)	51.8 (10.1)	52.6 (10.3)	52.7 (10.4)	53.0 (10.8)	52.7 (10.7)
• Canadian medical graduate, n (%)	968 (81.3)	240 (82.8)	142 (80.2)	216 (80.9)	124 (83.2)	241 (79.3)
Practice patterns						
• No. of LTC residents per MRP, median (IQR)	27 (7-59)	12 (5-30)	12 (4-46)	32 (5-64)	34 (13-62)	50 (23-85)
• No. of LTC homes per MRP, mean (SD)	1.5 (0.9)	1.3 (0.6)	1.6 (0.8)	1.6 (0.9)	1.6 (0.8)	1.7 (1.2)
• No. of visits per LTC resident per MRP, mean (SD)	2.6 (1.3)	1.9 (1.1)	2.0 (1.1)	2.5 (1.3)	2.7 (1.3)	3.5 (1.1)
• Percentage of visits to LTC homes, mean (SD)	23.1 (24.0)	13.0 (17.9)	15.9 (21.4)	21.8 (21.4)	31.2 (29.1)	34.1 (24.3)
• Percentage of visits to emergency departments, mean (SD)	2.9 (7.8)	7.6 (11.2)	2.6 (7.3)	1.6 (5.6)	0.6 (4.7)	0.9 (4.9)
• Percentage of visits to homes, mean (SD)	0.4 (1.2)	0.5 (0.9)	0.3 (0.7)	0.5 (1.4)	0.5 (1.3)	0.4 (1.5)
• Percentage of visits to hospitals, mean (SD)	6.3 (9.0)	8.8 (6.3)	10.1 (7.6)	5.9 (7.9)	4.1 (11.5)	3.4 (10.1)
• Percentage of visits in offices, mean (SD)	67.1 (23.4)	70.1 (18.8)	71.0 (21.2)	70.2 (21.9)	63.7 (30.0)	61.0 (24.9)
• Number of obstetric deliveries, mean (SD)	2.8 (11.0)	3.8 (11.9)	5.4 (15.5)	2.0 (9.9)	3.6 (12.4)	0.7 (5.2)
-Any obstetric delivery, n (%)	135 (11.3)	60 (20.7)	26 (14.7)	21 (7.9)	16 (10.7)	12 (3.9)
• Anesthesia payment, \$, mean (SD)	1527.0 (11006.7)	2983.9 (12623.3)	2938.9 (17371.1)	615.4 (8293.2)	1423.6 (12252.2)	181.6 (2941.8)
-Any anesthesia payment, n (%)	100 (8.4)	40 (13.8)	13 (7.3)	12 (4.5)	7 (4.7)	28 (9.2)
• Total number of all annual visits, mean (SD)	7983.8 (4128.9)	6401.2 (3054.1)	8313.4 (4231.9)	8567.2 (4181.0)	6773.9 (3151.5)	9425.4 (4652.0)

IQR—interquartile range, LTC—long-term care, MRP—most responsible physician.

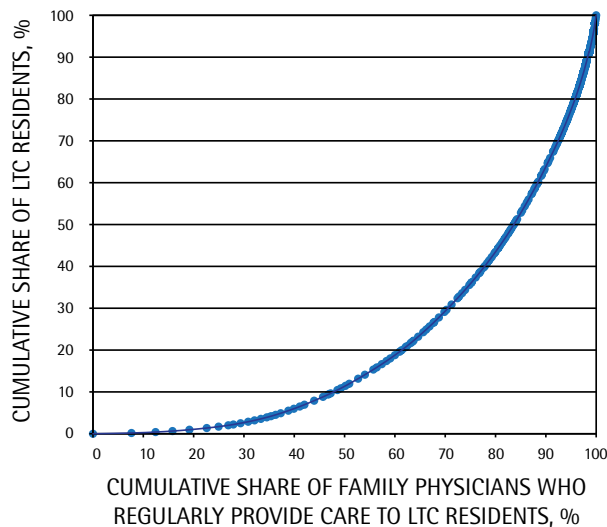
family physicians who were responsible for a cohort of 50 375 LTC residents. A substantial proportion (90.4%) of LTC residents were cared for by 628 family physicians, representing only 6.1% of all Ontario family physicians. This finding is similar to results from studies in the United States,¹⁷ including a nationally representative survey of US physicians,¹⁸ which reported that 20% of physicians were involved in LTC (spending a mean of 2 hours per week in LTC settings), and that 3% spent a substantial proportion of their practices in LTC.

Although the demographic characteristics of physicians who regularly treated LTC residents were similar across different community sizes (52.7 years old, urban

setting vs 51.8 years old, rural setting), important differences were observed in patterns of practice that could influence the design of future quality improvement interventions. In particular, the finding of increased LTC specialization among family physicians practising in urban centres compared with those in rural areas is noteworthy and consistent with previous research.¹⁴

The experiences of rural-practising and urban-practising LTC physicians differ greatly based on their varying levels of direct involvement and training in geriatrics. These differences in their experiences should be considered during the design of quality improvement interventions to efficiently build on each physician's academic background

Figure 1. Lorenz curve of the distribution of LTC residents across the family physicians who regularly provide care (Ontario, 2005)



LTC—long-term care.

and level of clinical involvement. In a survey of fellowship-trained, specialist geriatricians in the United States, 44% identified the focus of their current position to be “essentially all geriatrics,” and 73% reported that they worked within multidisciplinary teams.¹⁹ Although it is important to note that this is not always the case, rural-practising LTC physicians are more likely to be “inheritors”²⁰ of LTC practices. In many instances, rural family physicians have a broader practice base where service provision to the LTC setting is one component of a larger health practice. These differences in practice mix (ie, between the rural “LTC generalist” and the urban “LTC specialist”) could also influence the quality of care provided, not just physician response to quality improvement interventions. The LTC specialists might find themselves better equipped to coordinate a physician response in the event of a serious incident or infectious outbreak, or to develop, review, and revise medical and clinical policies and procedures based on best practice—2 quality improvement functions rated as essential or desirable by 80% of Canadian medical directors in LTC in a 2006 survey.²¹

While the findings highlighted by the Lorenz curve might be encouraging from a quality improvement perspective, it is uncertain how this concentration of care with a small number of physicians is affecting LTC residents. If the number of physicians who practise in LTC settings continues to decrease in the future, it could have

a negative effect on the quality of care. There is evidence that is suggestive of declining family physician participation in LTC homes. In Ontario, there was a 5% decrease in the proportion of family physicians who made more than 10 visits a year to LTC homes between the years 1990 and 2000.¹⁴ In a Canadian survey, 72.5% of LTC family physicians reported substantial sources of dissatisfaction and 42% had considered leaving LTC work in the previous 2 years.²² Given the potential positive contribution of family physicians to the LTC setting,³ it is important to consider strategies for supporting family physicians in LTC homes, as well as early strategies for recruitment and retention, among which increased fee schedules, on-call stipends, and increased exposure to LTC during residency are recommended by current LTC medical directors.²²

Limitations

At the time of this study, Ontario health administrative databases did not identify the physician responsible for each LTC resident's care; an algorithm was developed to assign residents to physicians. It was not possible to assign MRPs to all LTC residents who were identified in the Levels of Care Classification System database using the algorithm. For instance, we were not able to assign physicians to LTC residents when no billings for LTC services were submitted within the 30-day period before baseline. Therefore, our results can only be generalized to residents with readily identifiable physicians, which consisted of 79.6% of our population-based sample after applying initial exclusion criteria.


In sensitivity analyses, we extended the interval used for MRP assignment from 30 days to 120 days and were able to assign physicians to 82.4% of residents; most residents (80.6%) were assigned the same physician regardless of the time interval used. We elected to use the 30-day interval because MRPs assigned at that point provided the most proximal care to the classification date, and a longer interval would have increased the likelihood of residents receiving medical care from other health systems (eg, hospitals), which would shift the primary responsibility for care outside of the LTC setting.

Second, the physician assignment algorithm might not be accurate. The misclassification of physicians could lead to incorrect inferences of physician-level factors, which could bias our results to the null. Therefore, it is possible that some physician characteristics were not statistically significant owing to the misclassification of physicians. However, our approach in MRP assignment was based on a previous validated algorithm, which resulted in an 83% concordance rate with patient self-reported primary care physician.¹⁶

Third, this study was not able to take into account the models of primary care delivery in which groups of physicians work together in a network to provide care for patients. Future work should capture the effects of

these networks on physician practice. Finally, after having identified the physicians who regularly treat LTC residents and selected characteristics, the next step is to examine whether there are variations in the quality of care they provide. If variations in quality of care exist, it might be possible to identify specific characteristics or practice patterns associated with them, allowing for policy makers and decision makers to target specific groups of physicians. However, this must be done with caution, accounting for the size of a physician's practice, clinical characteristics of residents, and institutional factors, all of which have been shown to influence the quality of care.²³

Conclusion

This study highlights that a small number of family physicians are responsible for the care of a large percentage of Ontario LTC residents, and that this ratio varies by community size. For policy purposes, quality-of-care interventions directed at this selected group of health care providers might prove efficient, as there is the potential to affect a substantial number of LTC residents—particularly where medication management is concerned. The broader implications for how the concentration of care within a small pool of family physicians and the regional differences in their practice patterns affect overall quality of care for LTC residents requires further investigation. 

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Contributors

Mr Lam contributed to study concept and design, and analysis and interpretation of the data. He drafted the original manuscript. **Drs Anderson, Austin, and Bronskill** contributed to study concept and design, acquisition of the data, and analysis and

interpretation of the data. They revised the manuscript critically for important intellectual content. All authors gave final approval of the version to be published.

Competing interests

None declared

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