

Staffing rural emergency departments in Ontario: The who, what and where

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Abstract

Introduction: The emergency department (ED) in rural communities is essential for providing care to patients with urgent medical issues and those unable to access primary care. Recent physician staffing shortages have put many EDs at risk of temporary closure. Our goal was to describe the demographics and practices of the rural physicians providing emergency medicine services across Ontario in order to inform health human resource planning.

Methods: The ICES Physician database (IPDB) and Ontario Health Insurance Plan (OHIP) billing database from 2017 were used in this retrospective cohort study. Rural physician data were analysed for demographic, practice region and certification information. Sentinel billing codes (i.e., a billing code unique to a particular clinical service) were used to define 18 unique physician services.

Results: A total of 1192 physicians from the IPDB met inclusion as rural generalist physicians out of a total of 14,443 family physicians in Ontario. From this physician population, a total of 620 physicians practised emergency medicine which accounted for 33% of their days worked on average. The majority of physicians practising emergency medicine were between the ages of 30 and 49 and in their first decade of practice. The most common services in addition to emergency medicine were clinic, hospital medicine, palliative care and mental health.

Conclusion: This study provides insight into the practice patterns of rural physicians and the basis for better targeted physician workforce-forecasting models. A new approach to education and training pathways, recruitment and retention initiatives and rural health service delivery models is needed to ensure better health outcomes for our rural population.

Keywords: Emergency medicine, health human resource planning, rural physicians

Résumé

Introduction: Le service d'urgence des communautés rurales est essentiel pour la prise en charge des patients présentant des problèmes médicaux urgents et de ceux qui ne peuvent accéder aux soins primaires. En raison de la récente pénurie de médecins, de nombreux services d'urgence risquent de fermer temporairement. Notre objectif était de décrire les caractéristiques démographiques et les pratiques des médecins ruraux qui fournissent des services de médecine d'urgence en Ontario afin d'éclairer la planification des ressources humaines en santé.

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Méthodes: La base de données des médecins de l'ICES (IPDB) et la base de données de facturation de l'assurance-santé de l'Ontario (OHIP) de 2017 ont été utilisées dans cette étude de cohorte rétrospective. Les données sur les médecins ruraux ont été analysées pour obtenir des renseignements sur la démographie, la région de pratique et la certification. Les codes de facturation sentinelle (c'est-à-dire un code de facturation unique pour un service clinique particulier) ont été utilisés pour définir 18 services médicaux uniques.

Résultats: Sur un total de 14 443 médecins de famille en Ontario, 1 192 médecins de l'IPDB ont été inclus en tant que médecins généralistes ruraux. Parmi cette population de médecins, 620 pratiquaient la médecine d'urgence, ce qui représentait 33% de leurs jours de travail en moyenne. La majorité des médecins qui pratiquaient la médecine d'urgence étaient âgés de 30 à 49 ans et en étaient à leur première décennie de pratique. Les services les plus courants en plus de la médecine d'urgence étaient la clinique, la médecine hospitalière, les soins palliatifs et la santé mentale.

Conclusion: Cette étude permet de mieux comprendre les modes de pratique des médecins ruraux et de jeter les bases de modèles de prévision des effectifs médicaux mieux ciblés. Une nouvelle approche des parcours d'éducation et de formation, des initiatives de recrutement et de rétention et des modèles de prestation de services de santé en milieu rural est nécessaire pour garantir de meilleurs résultats en matière de santé pour notre population rurale.

Mots-clés: Médecine d'urgence, médecins ruraux, planification des ressources humaines en santé

INTRODUCTION

Many rural patients face significant challenges in accessing primary care. As a result, the emergency department (ED) has become essential for meeting a community's healthcare needs. In addition, previous research has shown that rural residents in Ontario are more likely than their urban counterparts to visit an ED for medical attention.^{1,2} Rural ED staffing has been an ongoing challenge since the 1990s with more than 40% of rural EDs in 2017 reporting a physician shortage, and the gap is expected to increase over the next decade.^{3,4} With the onset of the COVID-19 pandemic, the physician shortage has grown beyond the expected level and has put many rural EDs at risk of temporary closure.⁵ In 2022, more than 20 rural EDs in the province of Ontario temporarily closed with nearly every other province experiencing a similar pattern of closures due to staffing shortages. The closure of a single ED in Northern Ontario may result in several hours of additional travel to the next closest ED due to their geographic distribution.

Previous research has examined the range of services provided by family physicians and found that rural family physicians work to a fuller extent of their scope of practice than their urban colleagues.^{6,7} However, these studies rely on survey data that can suffer from low response rates, recall bias and over-representation from some physician demographics. As well, the number of clinical

services examined in these studies did not span the full range of services that family physicians can provide. Rural physicians have been described as 'extended generalists' and there is growing focus on Rural Generalist Medicine as a distinct field of practice.⁸⁻¹⁰ A better understanding of the services provided by rural physicians is important for health human resource planning (HHRP).

Our aim was to describe the demographics and practice patterns of physicians providing emergency medicine throughout rural Ontario. Using the ICES Physician Database (IPDB) and the Ontario Health Insurance Plan (OHIP) database, we identified rural physicians providing emergency medicine and other services. Given the differences in geography and resource availability, their practices were further described based on whether they practised in Northern or Southern Ontario.

METHODS

Setting

Ontario's landmass is 909,000 km² with 88% of the area located in Northern Ontario. Conversely, Northern Ontario only constitutes 6% of the province's population of 13.4 million.¹¹ Approximately 14% of Ontario's population is located in small rural communities with <1000 people and another 10% of the population live in communities of 1000–30,000 people.¹² Northern Ontario has two of the

16 academic health science centres in the province, three of the 44 community hospitals (i.e., defined as hospitals with >100 acute care beds) and 32 of the 90 rural and small urban hospitals (i.e., defined as hospitals with <100 acute care beds).¹⁵

The demographics and practice patterns of rural physicians practising emergency medicine was described based on their geographic location in either Northern or Southern Ontario. Wenghofer *et al.*, defined the boundary between Northern and Southern Ontario using the former Local Health Integration Network (LHIN) boundaries.⁷ Similarly, for this analysis, the areas formerly known as the Northeast LHIN and Northwest LHIN were considered Northern Ontario.¹⁴ This geographic descriptor was included in the analysis because of the differences in resources (e.g., significant differences in distances to major referral centres and locum coverage in Southern Ontario) for rural physicians practising in Northern and Southern Ontario.

Data

This retrospective cohort study used the 2017 IPDB and OHIP billing database. These were the most recent datasets available when the analysis was performed due to a time lag from when the data were generated to when it was available for analysis on the ICES system. These data sets were accessed using a secure virtual connection through the IDAVE system. The IPDB dataset contains encoded physician demographic information, physicians' practice region (i.e., LHIN region and rurality) and certification information. The OHIP dataset includes all physicians' billing information including the date of service, service type and service location.

Physician population

The physicians examined were those often referred to as general practitioners (GP) who completed the rotating internship prior to the early 1990s and those who completed at least 2 years of family medicine training certified by the College of Family Physicians of Canada (CFPC). Our physician population is referred to as rural family physicians, in this paper. They were selected from the IPDB based on several criteria including OHIP specialty code, the submitted OHIP billings

and physician rurality. The first step was to select physicians with an OHIP billing specialty code listed as 'family physician or general practitioner'. This criterion also captured CFPC certified physicians with certificates of added competence in emergency medicine since the IPDB lists their OHIP specialty as 'family physician or general practitioner'. Unfortunately, these physicians are not consistently identified in the IPDB and therefore we were unable to identify the number working in rural communities. A small subset of the physicians with an OHIP specialty code of 'family physician or general practitioner' were classified in the IPDB as practising specialists (e.g., general surgery, internal medicine, or obstetrics) based on their billing codes. These physicians were removed from the analysis since this was either an error or more likely they were physicians who held dual certifications in both family medicine and their listed specialty. In the second step, several hundred physicians with missing data for the OHIP billing specialty code were analysed to determine whether they were providing one of the services being investigated using the family practice billing codes listed in the OHIP schedule of benefits.¹⁵

In the third step, physicians who fell within the above criteria were further subdivided according to their rurality index of Ontario (RIO) score.¹⁶ The index combines the population, travel time to basic referral centres and travel time to advanced referral centres into a single measure of rurality. For the purpose of this paper, we have considered 'rural practice' to be that which is located in a community with a RIO score of 40 or greater.¹⁷ This definition is used widely in the literature including by ICES.¹⁸ As an example, the municipality of East Ferris in northeastern Ontario has a RIO score of 45. Their population is 4750, their basic referral centre is 16 km away (North Bay) and their advanced referral centre is 162 km away (Sudbury).

Physician services

Given that family physicians have a broad scope of practice, we first wanted to identify all of the services being provided by rural family physicians in their communities and then analyse those physicians practising emergency medicine. Using the Ontario Schedule of Benefits, a total of 18

services were identified along with the billing codes associated with those services.¹⁵ These services were used as a proxy for the diversity of practices that these physicians experience as rural generalist physicians. From an HHRP perspective, quantifying the range of services that these physicians provide in addition to emergency medicine was important to better understand the competing clinical responsibilities that these physicians provide to their communities. The unique set of billing codes for each of the 18 services will be known as sentinel billing codes. The 18 services identified were: Clinic, emergency medicine, anaesthesia, hospital medicine, home visits, mental health, long-term care, obstetrics, palliative care, surgical assisting, chemotherapy administration, sports medicine, chronic pain, care of the elderly, addictions medicine, endoscopy, allergy medicine and sleep medicine. These services were selected based on two of three criteria: (1) there must be a sentinel billing code available to define the service in the OHIP billing database, plus (2) the service must occur in a unique setting, or (3) the service could be reasonably delivered in a focused practice. Given the HHRP focus of this study, we were not interested in individual clinic procedures (e.g., vaccine administration, well-baby checks or Papanicolaou tests) but instead the range of unique services that rural family physicians might provide. To determine whether a physician provided a particular service, we used a minimum threshold for the number of patient encounters to define whether a physician provided that service or not.^{19,20} We specified a lower threshold for the services investigated based on the published literature. The thresholds were reduced in several cases to account for the increased number of services being provided by rural family physicians.

Analysis

For rural family physicians that met inclusion criteria, the sentinel billing codes for these physicians were extracted. The codes were then summarised for each physician by service to provide the total number of encounters by service (i.e., the total number of unique daily patient encounters) and the total number of days worked in a particular service. The data were formatted with each row representing a

unique rural family physician and each column a service being provided. The thresholds described in the previous section were then applied to the unique daily encounters to determine whether a physician provided that service as per our definition. The revised table was a 0/1 for each of the possible services. Demographic and practice characteristics for each physician were then combined with this table.

A frequency distribution was performed to compare physicians' years in practice to days worked in emergency medicine. Finally, a comparison analysis was performed to examine practice patterns that included the most common services provided, average days worked in emergency medicine, the average number of services provided in addition to emergency medicine as well as the number of physicians with a focused practice in emergency medicine.

Research Ethics

This study received institutional research ethics board approval from Lakehead University (#1466634).

RESULTS

In the IPDB, a total of 1192 rural family physicians were identified out of a total of 14,443 physicians with similar certifications [Table 1]. More than 50% of rural family physicians practised emergency medicine in Northern and Southern Ontario with an additional 10% of physicians providing some care in the ED but not meeting the minimum threshold. Fewer female rural family physicians practised emergency medicine in Southern Ontario versus Northern Ontario and only 10% of physicians practising emergency medicine were under 30 years of age. In both Northern and Southern Ontario, over half of the rural family physicians were in the first decade of their career with an equal percentage in the second and third decades (i.e., 20%) in the south. Notably, in Northern Ontario, more rural family physicians in the third decade than the second practised emergency medicine (i.e., 21% vs. 16%).

For each rural family physician practising emergency medicine, we developed a practice description using the ICES data [Table 2]. On average, these rural family physicians worked

190 days per year for all of the services they provided in the north and south. On average, emergency medicine comprised about 30% of their total days worked in 2017. The range of days worked was from 2 to 242 days in the north and up to 275 days in the south. The rural family physicians on average provided 4.2 services to their communities, including emergency medicine. Many of these physicians (i.e., 64% in Northern Ontario and 54% in Southern Ontario) provided five or more clinical services to their patient population. In Southern Ontario, 14% of the physicians practised only in the ED while only 6% had a similar practice in the north. The most common services in addition to emergency medicine were clinic, hospital medicine, palliative care and mental health.

Rural family physicians in their first decade of practice, proportionally worked more days in emergency medicine with the majority working <50 days per year [Figure 1]. Physicians in their third decade of practice worked more days in the ED than physicians in their second decade.

DISCUSSION

This study provides an important new contribution to understanding the rural family physician workforce providing emergency medicine care in Ontario. Using the OHIP billing database and the IPDB we were able to objectively describe the characteristics and practice patterns of rural family physicians staffing EDs in Ontario. In general, about 50% of rural family physicians practise emergency medicine. As these physicians age, the rate of

practice in emergency medicine declines. These rural family physicians spend approximately one-third of their total days working in the ED and more than half of the physicians provide 5 or more clinical services to their community. There was little difference between the demographics in the rural family physician population in the north and south.

This study complements the previous work of Wong and Stewart and Wenghofer *et al.*

Table 1: A description of rural physicians practising emergency medicine in Ontario

	North rural, n (%)	South rural, n (%)	Total, n (%)
Rural family physicians	424	758	1192
Total rural family physicians practising EM	219 (52)	401 (53)	620
Total physicians billing at least 1 EM code	267 (63)	481 (63)	748
Female physicians practising EM	87 (40)	136 (34)	223
Age of physicians practising EM			
<30	12 (5)	32 (8)	44 (7)
30-49	127 (58)	247 (62)	374 (60)
50+	80 (37)	122 (30)	202 (30)
Years in practice of physicians practising EM			
<10	126 (58)	216 (54)	342 (55)
10-19	34 (16)	79 (20)	113 (18)
20-29	45 (21)	82 (20)	127 (20)
30+	14 (6)	24 (6)	38 (6)

EM: Emergency medicine.

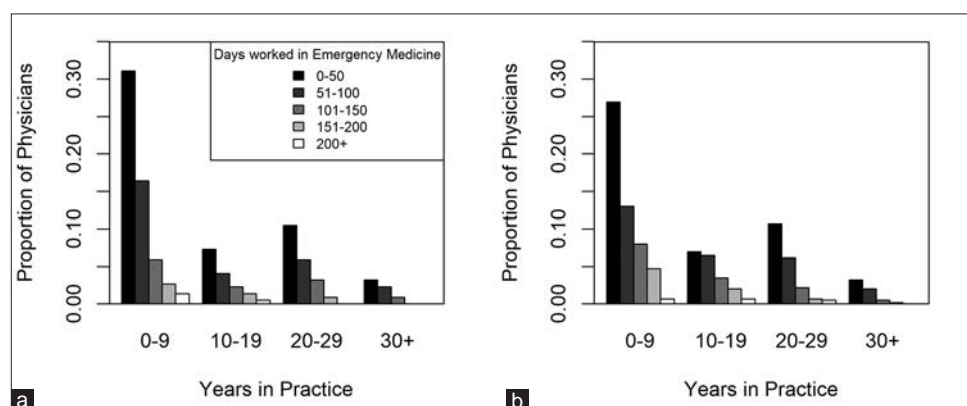


Figure 1: The proportion of days worked in the emergency department by physicians with different years in practice. (a) Northern rural physicians (b) Southern rural physicians.

Table 2: A description of time spent practising emergency medicine and other services provided by these physicians

	Rural North	Rural South
Average total days with at least one billing for all services provided (minimum–maximum)	191 (6–363)	193 (2–344)
Average days with at least one billing in EM (minimum–maximum)	61 (2–242)	66 (2–275)
Percentage of practice in EM based on days (%)	32	34
Average number of services provided including EM (minimum–maximum)	4.2 (1–11)	4.3 (1–10)
Number of services provided by rural family physicians practising EM, <i>n</i> (%)		
1**	13 (6)	56 (14)
2	11 (5)	28 (7)
3	11 (5)	37 (9)
4	43 (20)	63 (16)
5	53 (24)	73 (18)
6	41 (19)	57 (14)
7	31 (14)	55 (14)
8+	16 (7)	32 (8)
Five most common services provided by rural physicians practising EM (%)		
1	Clinic (89)	Clinic (80)
2	Palliative care (84)	Palliative care (66)
3	Hospital medicine (83)	Hospital medicine (60)
4	Mental health (36)	Mental health (56)
5	Long-term care (30)	Home visits (25)

**Focused EM practice. EM: Emergency medicine.

because it takes a different approach using a more comprehensive data set and analysis.^{6,7} The previous studies relied on survey data and have limitations as noted in our Introduction. The ICES data are more likely to reflect actual services provided because they were collected for billing purposes. This study expands the number of services being examined and provides a more accurate representation of the physician practice patterns and geographical distribution.

Studies using similar data sets from ICES have focused on specific stages of practice (i.e., the years prior to retirement) or attempted to better understand comprehensive primary care and were not focused on the breadth of unique services that family physicians are providing.¹⁹⁻²¹ Although this study showed a decline in the number of rural family physicians practising emergency medicine as their career progressed, other studies have demonstrated a similar overall decline in the proportion of family physicians practising emergency medicine and comprehensive primary care.^{19,21-23} Understanding why fewer rural family physicians practise emergency medicine as their career progresses is an important research

direction that may provide information for future retention strategies.

The COVID-19 pandemic has exacerbated an existing HHRP problem in many rural communities.^{5,22} Traditional physician resource planning relied on ‘headcount’ data or ratios of patients to physicians to determine the appropriate number of doctors for a community. For example, in Ontario during the first iteration of the Rural and Northern Physician Group Agreement contracts in the early 2000s, decision makers used a modified Delphi methodology to determine the physician complements. Their approach used a ratio of 1:1380 (i.e., physicians to patients) with arbitrary multipliers to account for differences in community resources and services to determine the number of funded physician positions.²⁴ Previous work has recognised the need to move beyond this static and simplistic determination of community need.^{19,22} Rural family physicians often practise to a fuller extent of their scope of practice and provide more services than their urban colleagues.^{6,7} This has major implications when determining the complement of physicians required for rural communities. With the addition

of each service provided by a rural family physician, their time available to provide the full-spectrum of community-based family practice services declines and thus a greater number of physicians is required within the community.

The challenge of providing primary health care in rural communities may be reflected in the greater ED use observed in rural and northern communities compared to urban centres.¹ The professional expectations of rural family physicians has grown over the past several decades. With the expansion of rural training opportunities across Canada, rural family physicians have considerable responsibility for training medical students and resident physicians. In addition to the educational obligations, these physicians have administrative and leadership roles in their communities, and many are introducing research activities as a component of their practice. These non-clinical activities are not reflected in the OHIP billing database. Not only is the practice of rural medicine changing but so are the physicians working in the rural environment. There is a generational change in the practice style and desired lifestyle of recent graduates who want greater collaborative arrangements and flexibility in their practices.²⁵

In 2016, the Canadian Association of Emergency Physicians (CAEP) estimated that Canada required an additional 169 physicians to staff rural EDs.³ They forecasted that number would grow to 393 by 2021 and to 748 physicians by 2026. This forecasted 'gap' by CAEP was made under the assumption that these physicians work more than 70% of their time in the ED. Since rural family physicians typically work well below this threshold in the ED due to their other clinical responsibilities, the required number of physicians needed for rural communities is likely much higher.

With the recognition that rural EDs and rural medicine in general will face significant staffing challenges in the coming decades, a new approach to planning, recruiting and retaining a rural health workforce is needed.²⁶ The most recent published physician-supply forecasts in Ontario were completed in 2010 through a collaborative effort by the Ontario government and Ontario Medical Association. However, these forecasts failed to provide an accurate estimate of physician supply, with most scenarios predicting that the province would have a sufficient number of

family physicians by 2018.²⁷ A tailored approach to planning and forecasting the rural workforce must be developed that accounts for the multiple services that these physicians provide. This study provides a basis for understanding the range of services delivered to rural communities and would inform these forecasting models.

In addition to improved modelling and forecasting of the workforce, medical school initiatives that provide early rural experiences to medical learners that promote and recruit new physicians to these practices may prove beneficial.²⁸⁻³⁰ The CFPC has recently recommended that family medicine resident programmes in Canada be extended to 3 years.³¹ One of the goals of extending the training period for residents is to provide them with better educational and clinical experiences that will improve confidence in core areas of family medicine and promote practices that provide comprehensive care to patients. This study and others demonstrate that a greater importance should be placed on supporting rural generalist physicians to maintain their full spectrum generalist practice as they progress through their career. Finally, the implementation of physician retention strategies that include the opportunity for part-time employment, a larger complement of physicians within the community and an emphasis on physician wellness must be a priority to ensure that gains in the workforce are maintained.³²

A potential limitation of this study is that physicians who practise under non-fee-for-service compensation models and submit billing codes for a percentage of the clinical fee known as 'shadow billings' may not provide a complete tally of the services provided. Therefore, we consider our analysis to be providing a lower bound on the estimates of physician services being provided. The care provided by nurse practitioners and other allied healthcare professionals is also not captured in the OHIP billing database. In addition, our analysis only examined family physicians and missed the small number of physicians certified by the Royal College of Physicians and Surgeons of Canada who can be identified in the ICES dataset who practised rurally in 2017. This dataset does not include non-OHIP billable services (e. g., coroner or aesthetic medicine) that could potentially account for a proportion of these physicians' time. Finally, our analysis was

performed prior to the pandemic and the staffing situation in rural EDs across the country has become much worse. This analysis should provide a basis for further investigation of the effect of the pandemic on rural EDs.

CONCLUSIONS

Our results provide new insight into the practice patterns of rural family physicians and are consistent with recognition of rural generalist medicine. This new information provides the basis for better targeted physician workforce forecasting models in general and specifically for the rural physician workforce. In addition, the study provides further impetus for developing evidence informed by education and training pathways, recruitment and retention initiatives and rural health service delivery models.

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