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Food security

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I find it humbling to remember that I have no personal experience of chronic hunger, while many of my patients do. 18.4% of Canadian households experienced food insecurity in 2021.¹ Food insecurity is particularly felt in remote Canada. In Nunavut, the food insecurity rate was 57% in 2018.² When your source of groceries is the Northern Store whose stock in SPAM exceeds their stock in lettuce, even if both are a tad brown, this quickly becomes a health outcomes issue.

Indigenous cultural revival helps some, and although the hunting has been made a little easier (e.g. ATV and rifle), gathering remains difficult. For our local blueberries and wild mushrooms, carriage trade pricing at the roadside, or a speciality market in Toronto, makes them more of a source of income than other foods.

Rural communities closer to the city also suffer high levels of poverty with associated health outcomes and issues similar to remote areas:

- Dental carries in toddlers – check. Pop is cheaper than milk
- The diabetic whose A1C is hard to manage, especially at the end of the month – check. Educate diabetics that if they are to skip a meal, they should avoid sulphonylureas or prandial insulin to avoid hypoglycaemia
- The elderly ‘tea and toast’ pensioner whose anaemia is attributable to Vitamin C deficiency – check. Fruit and veggies are often

under-represented in their diets. Remember to have them take their iron with Vitamin C

- Hypertension – check. Salt levels in processed foods and fast foods are excessive.

Counter-intuitively, many obese patients have nutritional deficits attributable at least in part to the high cost of healthy food. High levels of sugar, starch and fat found in fast and processed foods add empty calories. Simple education about avoiding unhealthy coping strategies for many health issues can be of help.

If you are unaware of the effect of food insecurity on your patients, you can ask. When you do, you destigmatise food insecurity and identify a vulnerable target population. A simple question would suffice – ‘In the last 12 months did you worry about your food running out before you got money to buy more?’

Rural doctors have a disproportionate influence on their patients and rural communities. Initiatives such as food banks, school lunch programmes, community gardens and education about eating well can all use our support.

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Sécurité alimentaire

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C'est avec humilité que je me rappelle que je n'ai aucune expérience personnelle de la faim chronique, alors que beaucoup de mes patients en ont une. 18,4% des ménages canadiens ont connu l'insécurité alimentaire en 2021.¹ L'insécurité alimentaire est particulièrement ressentie dans les régions reculées du Canada. Au Nunavut, le taux d'insécurité alimentaire était de 57% en 2018.² Lorsque votre source d'approvisionnement est le Northern Store, dont le stock de SPAM dépasse celui de la laitue, même si les deux sont un peu bruns, cela devient rapidement un problème de santé.

La renaissance de la culture autochtone aide un peu, et bien que la chasse ait été rendue un peu plus facile (par exemple, le VTT et le fusil), la cueillette reste difficile. En ce qui concerne les myrtilles et les champignons sauvages locaux, les prix pratiqués sur le bord de la route ou sur les marchés spécialisés de Toronto en font une source de revenus plus importante que d'autres aliments.

Les communautés rurales plus proches de la ville souffrent également de niveaux élevés de pauvreté, avec des résultats et des problèmes de santé similaires à ceux des zones reculées:

- Les caries dentaires chez les tout-petits. Les boissons gazeuses sont moins chères que le lait
- Le diabétique dont l'HbA1c est difficile à gérer, surtout à la fin du mois. Expliquez aux diabétiques que s'ils sautent un repas, ils doivent éviter les sulfonyles ou l'insuline prandiale pour éviter l'hypoglycémie
- Le retraité dont l'anémie est due à une carence en vitamine C. Les fruits et légumes sont souvent sous-représentés dans leur

alimentation. N'oubliez pas de leur faire prendre leur fer avec de la vitamine C

- Hypertension. La teneur en sel des aliments transformés et des fast-foods est excessive.

Contre toute attente, de nombreux patients obèses présentent des déficits nutritionnels imputables, au moins en partie, au coût élevé des aliments sains. Les niveaux élevés de sucre, d'amidon et de graisse que l'on trouve dans les aliments rapides et transformés ajoutent des calories vides. Une simple sensibilisation à la nécessité d'éviter les stratégies d'adaptation malsaines pour de nombreux problèmes de santé peut s'avérer utile.

Si vous ne connaissez pas les effets de l'insécurité alimentaire sur vos patients, vous pouvez poser la question. Vous déstigmatisez ainsi l'insécurité alimentaire et identifiez une population cible vulnérable. Une simple question suffit: «Au cours des 12 derniers mois, avez-vous craint de manquer de nourriture avant d'avoir suffisamment d'argent pour en acheter?».

Les médecins ruraux ont une influence disproportionnée sur leurs patients et les communautés rurales. Les initiatives telles que les banques alimentaires, les programmes de restauration scolaire, les jardins communautaires et l'éducation à une bonne alimentation peuvent toutes bénéficier de notre soutien.

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PRESIDENT'S MESSAGE

Primary care reform in a rural context

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Calls for reform to primary care are growing, as our health system cannot support the status quo. Here in New Brunswick, many rural communities have lost physicians, and it has been impossible to find a replacement. They leave due to retirement, but also due to heavy administrative and financial burdens, frustration with fracturing of care, and lack of control over system issues. Workloads are unsustainable and there are no locums to provide relief. Like many, I find myself telling several patients a day that my practice is full and that I cannot accept new patients. This is particularly painful to do in a rural area, as access to other options for primary care is so limited. Those who have lost their family physician have, at best, access to episodic care with providers who do not embrace a holistic view of the patient and their problem. As a result, missed diagnoses and late presentations for conditions are a too-common occurrence we see in our work in emergency departments, operating rooms, or labour and birth units. However, we already are doing too much, and cannot take on more. We must do things differently.

A shift to team-based care is critical, and we need robust systems to support each other. However, a rural 'team' may look different from an urban-based one. Perhaps, co-location will not work, and we may need a network type model

of care, using technology to enhance communication and collaboration. Ensuring all providers work to the top of their scope of practice, investing in dedicated, funded time for case management, and expanding the types of health providers on teams, may all be considerations. As rural generalists, our role extends beyond the office, and this must be part of workforce planning and remuneration. Finally, we must accept we may not be the most appropriate provider to perform every service.

Solutions may also include enhancing practice-eligible routes of training and enhanced pathways for internationally educated health professionals to enter the workforce. We must develop the supports needed for individuals to integrate within teams and communities, assuming roles as mentors or supervisors, but perhaps also confronting some uncomfortable realities regarding bias and racism.

Beyond this, it will be critical that our training programmes continue to prepare graduates to have the specific, unique skills required to practice in rural and remote regions of this country. And finally, we must continue our advocacy work, particularly with respect to reducing administrative burdens and national licensure (*see page 13). With this, we can develop the teams needed to continue to provide high quality care close to home, in all parts of this country.

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MESSAGE DE LA PRÉSIDENTE

La réforme des soins primaires dans un contexte rural

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Les appels à la réforme des soins primaires se multiplient, car notre système de santé ne peut supporter le statu quo. Ici, au Nouveau-Brunswick, de nombreuses communautés rurales ont perdu des médecins et il a été impossible de les remplacer. Ils partent à la retraite, mais aussi en raison des lourdes charges administratives et financières, de la frustration causée par la fragmentation des soins et du manque de contrôle sur les questions liées au système. Les charges de travail sont insoutenables et il n'y a pas de suppléants pour les remplacer. Comme bien d'autres, je me retrouve à dire à plusieurs patients par jour que mon cabinet est plein et que je ne peux pas accepter de nouveaux patients. C'est particulièrement pénible à faire dans une zone rurale, car l'accès à d'autres options de soins primaires est très limité. Les personnes qui ont perdu leur médecin de famille ont, au mieux, accès à des soins épisodiques dispensés par des prestataires qui n'adoptent pas une vision holistique du patient et de son problème. En conséquence, les diagnostics manqués et les présentations tardives de pathologies sont des phénomènes trop fréquents que nous observons dans notre travail, dans les services d'urgence, les salles d'opération ou les unités de travail et d'accouchement. Pourtant, nous en faisons déjà trop et nous ne pouvons pas en faire plus. Nous devons faire les choses différemment.

Le passage aux soins en équipe est essentiel, et nous avons besoin de systèmes solides pour nous soutenir mutuellement. Cependant, une « équipe » rurale peut être différente d'une équipe urbaine. Il se peut que le regroupement ne fonctionne pas et que

nous ayons besoin d'un modèle de soins de type réseau, utilisant la technologie pour améliorer la communication et la collaboration. Il faut veiller à ce que tous les prestataires travaillent dans les limites de leur champ d'activité, investir dans un temps dédié et financé pour la gestion des cas et élargir les types de prestataires de santé au sein des équipes. En tant que généralistes ruraux, notre rôle s'étend au-delà du cabinet et cela doit faire partie de la planification des effectifs et de la rémunération. Enfin, nous devons accepter le fait que nous ne sommes peut-être pas le prestataire le plus approprié pour chaque service.

Les solutions peuvent également inclure l'amélioration des voies de formation éligibles à la pratique, ainsi que l'amélioration des voies d'accès à la main-d'œuvre pour les professionnels de la santé formés à l'étranger. Nous devons développer le soutien nécessaire pour que les individus s'intègrent dans les équipes et les communautés, en assumant des rôles de mentors ou de superviseurs, mais peut-être aussi en se confrontant à certaines réalités inconfortables en matière de préjugés et de racisme.

En outre, il sera essentiel que nos programmes de formation continuent à préparer les diplômés à posséder les compétences spécifiques et uniques requises pour exercer dans les régions rurales et éloignées de ce pays. Enfin, nous devons poursuivre notre travail de sensibilisation, notamment en ce qui concerne la réduction des charges administratives et l'autorisation d'exercer au niveau national (voir page 13). Grâce à cela, nous serons en mesure de développer les équipes nécessaires pour continuer à fournir des soins de haute qualité près de chez soi, dans toutes les régions de ce pays.

Assessing new patient attachment to an integrated, virtual care programme in rural primary care

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Abstract

Introduction: An estimated 20% of residents of Renfrew County, a rural and underserved community in Ontario, do not have a family physician or alternative primary care provider. Integrated virtual care (IVC) aims to address this crisis by enrolling individuals who are not currently attached to a primary care provider, to a named family physician who works predominantly remotely. The physician is embedded within an existing, local family health team. The aim of this study was to assess and describe the IVC model's capacity to enrol previously unattached patients in Renfrew County and provide adequate primary care.

Methods: We conducted a cross-sectional, descriptive study of data collected from patients enrolled for at least 3 months to an IVC family physician from 15 November 2021 (earliest appointment date for first IVC patients) to 30 June 2022 inclusive.

Results: $N = 790$ patients were successfully attached to a family physician and received at least 3 months of care through IVC within the study period. Of the study population, 65% were female and over 75% were under the age of 55. Among patients who were current smokers at the time of IVC enrolment ($n = 115$), approximately 1 in 5 (18.3%) started a smoking cessation programme following referral by their IVC physician. In addition, IVC physicians and allied health professionals performed 66 colorectal cancer screenings, 164 cervical cancer screenings and 39 breast cancer screenings during the study period, bringing many overdue patients up to date for routine testing.

Conclusion: IVC has been successful in attaching previously unattached patients to a family physician and providing, comprehensive, team-based primary care during its initial 7 months of operation. Similar integrated primary care delivery concepts can also use these results to guide their own development and quality improvement.

Keywords: Family medicine, integrated virtual care, rural medicine, rural patients

Résumé

Introduction: On estime que 20% des habitants du comté de Renfrew, une communauté rurale et mal desservie de l'Ontario, n'ont pas de médecin de famille ou d'autre prestataire de soins primaires. Le programme de Soins virtuels intégrés (SVI) vise à résoudre cette crise en proposant aux personnes qui n'ont pas de prestataire de soins primaires de consulter un médecin de famille désigné qui travaille principalement à distance. Le médecin est intégré à une équipe de santé

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familiale locale existante. L'objectif de cette étude était d'évaluer et de décrire la capacité du modèle de SVI à inscrire des patients qui n'étaient pas rattachés à un prestataire de soins primaires dans le comté de Renfrew et à leur fournir des soins primaires adéquats.

Méthodes: Nous avons mené une étude transversale et descriptive des données recueillies auprès des patients inscrits depuis au moins trois mois auprès d'un médecin de famille IVC entre le 15 novembre 2021 (date de rendez-vous la plus proche pour les premiers patients SVI) et le 30 juin 2022 inclus.

Résultats: $N = 790$ patients ont été rattachés avec succès à un médecin de famille et ont reçu au moins 3 mois de soins par l'intermédiaire des SVI au cours de la période d'étude. Parmi la population étudiée, 65% étaient des femmes et plus de 75% avaient moins de 55 ans. Parmi les patients qui fumaient au moment de leur inscription aux SVI ($n = 115$), environ 1 sur 5 (18,3%) a entamé un programme de sevrage tabagique après avoir été orienté par son médecin en SVI. En outre, les médecins du centre et les professionnels paramédicaux ont effectué 66 dépistages du cancer colorectal, 164 dépistages du cancer du col de l'utérus et 39 dépistages du cancer du sein au cours de la période d'étude, ce qui a permis à de nombreux patients en retard de SE soumettre à des tests de routine.

Conclusion: Le programme de SVI a réussi à mettre en relation des patients qui ne l'étaient pas auparavant avec un médecin de famille et à fournir des soins primaires complets en équipe au cours de ses sept premiers mois d'activité. Des concepts similaires de prestation de soins primaires intégrés peuvent également utiliser ces résultats pour guider leur propre développement et l'amélioration de la qualité.

Mots-clés: Médecins de soins virtuels intégrés, médecine rurale, médecins de famille, patients ruraux isolés

INTRODUCTION

Renfrew County and integrated virtual care

Rural and remote communities face challenges in providing equitable and adequate accessibility to comprehensive primary care.¹ Rural areas are often large with dispersed facilities, increasing the travel burden to accessing primary care for most rural residents.² This is also exacerbated by the smaller and dispersed populations of rural areas, as they may not support an adequate supply of family physicians.^{1,3}

Like many rural communities, Renfrew County in Ontario (approximate population: 106,365)⁴ does not have enough family physicians to fully meet the needs of the community. Approximately 20% of residents do not have attachment to a family physician or alternative primary care provider.⁵ With no urgent care or walk-in clinics, residents of Renfrew County must often choose between accessing care at the emergency department (ED) or to forego care entirely.⁶ This includes those residing in Petawawa (approximate population: 18,160⁴), the largest community in Renfrew County. Petawawa comprises a mix of semi-urban and rural residents and includes families of military personnel from the nearby Petawawa Garrison. However, while the military personnel receive their primary care at the garrison, their families must find primary care in the community.

Integrated virtual care (IVC) aims to address the problem of low primary care attachment and insufficient local physician workforce in Renfrew County by enrolling individuals, who are not currently attached to a family physician or alternative primary care provider, to a named family physician who works predominantly remotely. The physician is embedded within the Petawawa Centennial Family Health Centre (PCFHC), as part of an existing, local Family Health Team. PCFHC has a blended salary, patient enrolment model for physicians.

IVC patients receive comprehensive, team-based primary care with family physician leadership, through a blend of in-person and virtual care options. When care is provided by allied health professionals in the local family health team, these interactions are communicated efficiently with the patient's doctor.⁷ Virtual care options with IVC include secure messaging, telephone and video encounters and enhanced telemedicine options at the PCFHC. Partnership with the existing community paramedicine programme allows a range of at-home care options for vulnerable, housebound patients. Other physicians, nurse practitioners and allied health professionals within the group, provide in-clinic care options for enrolled IVC patients. At all times, the named IVC family physician retains overall responsibility for their patients' primary care.

The implementation of a virtual triage and assessment centre (VTAC) in Renfrew County during the COVID-19 pandemic⁵ was found to be effective at providing acute, episodic care and reducing both ED visits and hospitalisations in Renfrew County.⁶ While IVC may have a downstream effect of helping reduce ED volumes in Renfrew County, the overall aim of IVC is to attach patients and provide comprehensive primary care. Notably, a preliminary patient satisfaction study of an early iteration of the IVC model ($n = 121$) reported that 90% of patients were either very satisfied or satisfied with the care from their IVC family physician and 75% felt that their IVC experience was as good or better than any previous in-person care.⁸ While these results suggest that IVC can provide acceptable care to patients, IVC's ability to attach patients to a family physician and provide primary care services has yet to be assessed and quantified.

The primary objective of this study was to describe the IVC model's capacity to enrol previously unattached patients in Renfrew County and provide adequate primary care. As metrics of clinical care, we evaluated cancer screenings and smoking cessation referrals among a convenience sample of previously unattached patients, who were attached to an IVC family physician for at least 3 months.

METHODS

Study design and population

The present descriptive study evaluated data collected from a cohort of patients attached for at least 3 months to an IVC family physician from 15 November 2021 (earliest appointment dates for first IVC patients) to 30 June 2022 inclusive. Therefore, patients in this study must have been enrolled into the IVC programme by 31 March 2022 and were thus receiving care for at least 3 months and up to seven and a half months.

There was no recruitment of patients performed directly for this study. Unattached residents of Petawawa in Renfrew County, who had accessed acute care through VTAC⁵ more than once, were routinely approached to see if they and any unattached members of their household would like to join IVC.

To be included in the study population, IVC patients must have met all the following inclusion criteria.

- Eighteen years of age or older at the time of enrolment
- Attached to a named IVC family physician for at least 3 months as of 30 June 2022 inclusive
- Able to read and converse in English.

Study measures and data collection

All data used in this study were collected routinely as part of clinical practice from IVC patients. All patients interested in enrolling in IVC are routinely sent an electronic consent form⁹ and an administration form¹⁰ to complete through Ocean (CognisantMD, Toronto, ON), a secure and encrypted E-mailing system. This form collects sociodemographic data, as well as information on patient and family medical history.

The onboarding process leading to enrolment to an IVC family physician includes collation of the patient's medical history and a review of their existing medications by a pharmacist. A medical chart and cumulative patient profile are completed prior to the first encounter with their new family physician. A first virtual appointment with the named family physician is then booked over the phone or by video. Patients typically have their first appointment virtually with their new family physician within 2 weeks of finishing the enrolment process.

Study data were obtained retrospectively from a report generated from the IVC electronic medical records (EMR). An exhaustive chart review of the EMR (OSCAR, McMaster University, ON) for all patients included in this study was conducted by the data custodian (LH) to ensure the accuracy of the demographic and clinical data used and reported in this study. Complete data were available for all patients included in the study population.

Outcomes

We reviewed cancer screening tests performed for colorectal cancer, cervical cancer and breast cancer, among the study population from the time of IVC enrolment to the inquiry date on 1 July 2022. Ontario guidelines and recommendations for cancer screening were used to determine the number of patients in the study who were eligible and overdue for colorectal, cervical and breast cancer screening at the time of IVC enrolment.¹¹ We also evaluated the number of new

referrals and subsequent enrolments to smoking cessation programmes among current smokers during the study period.

Ethical considerations

This study was approved by the Montfort Hospital Research Ethics Board.

RESULTS

Descriptive statistics of the study sample are provided in Table 1. During the study period, IVC attached 790 adult patients to a family physician, who all met inclusion criteria and were included in the study population. All patients were enrolled into IVC for 3–7 months, with a median follow up time of 183 days (standard deviation [SD] =39.6).

Most of the study population was female (65.7%) and aged 64 or younger (82.3%). 115 patients in the study sample were current smokers at time of IVC enrolment, and as of June 2022, approximately 20% had been referred to a smoking cessation programme. The prevalence of chronic diseases was relatively low, for example, hypertension was present among only 22.8% patients. Mental health issues had a higher prevalence with 38.5% of patients suffering from either depression or anxiety and 15.2% experiencing both depression and anxiety.

Over the course of the 7-month study period, there were 2823 unique IVC patient appointments. Seventy per cent (1988) of these appointments were conducted virtually with one of the three IVC physicians and the other 30% (835) of appointments were conducted in-person with one of the six IVC allied health professionals. The median number of appointments for patients during the study period was 3 (SD = 2.57).

During the study period, IVC physicians and allied health professionals performed 66 colorectal cancer screenings, 164 cervical cancer screenings and 39 breast cancer screenings, helping to bring many overdue patients up to date for routine testing [Table 2]. For example, the 66 colorectal cancer screening tests performed since the index date increased the proportion of eligible patients who were up to date for screening from 6.9% (17 of 245) to 33.9% (83 of 245). These results demonstrate that IVC was effective at identifying unscreened patients, and, often within a few weeks of enrolment, performing catchup screenings.

Table 1: Study population descriptive statistics (N=790)

Study characteristic	n (%)
Age (years), mean (SD)	47.64 (16.49)
18–34	209 (26.5)
35–49	223 (28.2)
50–64	218 (27.6)
65–79	116 (14.7)
80+	24 (3.0)
Sex	
Male	271 (34.3)
Female	519 (65.7)
Current tobacco use	115 (14.6)
Referral to smoking cessation programme	21 (18.3)*
Chronic diseases	
Hypertension	180 (22.8)
COPD	30 (3.8)
CHF	9 (1.1)
Diabetes	83 (10.5)
Mental health	
Anxiety	236 (29.9)
Depression	188 (23.8)
Anxiety or depression	304 (38.5)
Anxiety and depression	120 (15.2)

*Sample for calculation included only those who were current smokers (n=115). COPD: Chronic obstructive pulmonary disease, CHF: Congestive heart failure, SD: Standard deviation

DISCUSSION

Overall, IVC has been an efficient vehicle for improved equity in access to primary care in Renfrew County by increasing the availability of attachment to comprehensive team-based primary care with family physician leadership. During its first 7 months of operation, IVC successfully attached 790 (previously unattached) patients to a named family physician and conducted over 2800 patient appointments during the study period. IVC was also effective in both identifying patients requiring preventative care and improving access to relevant interventions and performing over 200 cancer screening tests for eligible and overdue patients.

IVC was found to be highly effective and efficient at providing preventative care among its patient population. Upon enrolment in IVC, only 6.9%, 22.4% and 17.0% of eligible patients were known to be up to date for routine colorectal, cervical and breast cancer screening, respectively. As of 30 June 2022 (end of study outcome window), 33.9%, 58.9 and 39.2% of eligible IVC patients were up to date for these three cancer screening tests, respectively. IVC was responsible for a large

Table 2: Cancer screening among the study patient population

Routine cancer screening performed	Number of eligible patients entering IVC ^a	Number of eligible patients known to be up to date for screening at IVC enrolment (%) ^b	Number of screening tests performed since index date ^c	Number of eligible patients known to be up to date for screening at end of outcome window (%) ^d
Colorectal cancer screening	245	17 (6.9)	66	83 (33.9)
Cervical cancer screening (Pap)	450	101 (22.4)	164	265 (58.9)
Breast cancer screening (mammogram)	176	30 (17.0)	39	69 (39.2)

^aPatients aged 50–75 at the time of IVC enrolment were considered eligible for colorectal cancer screening. Female patients aged 21–69 and aged 50–75 were considered eligible for cervical cancer and breast cancer screening, respectively, ^bPatients were considered up to date if their last cancer screening test occurred within 2 years before IVC enrolment for colorectal cancer, 3 years before IVC enrolment for cervical cancer screening, and 2 years before IVC enrolment for breast cancer screening, ^cIndex date was 15 November 2021 (earliest appointment date for first IVC patients), ^dEnd of outcome window was 30 June 2022 inclusive. IVC: Integrated virtual care

absolute increase in the proportion of patients who received recommended routine cancer screenings. Moreover, approximately 1 of 5 current smokers in the study sample were referred to, and enrolled in, a smoking cessation programme since IVC enrolment [Table 1]. These results highlight IVC's ability to improve access to, and increase rates of, preventative care interventions.

The shift from predominantly in-person clinical appointments to virtual care and mixed model options during the COVID-19 pandemic was recently found to have no increase on ED use among individuals attached to a family physician in Ontario.¹² This suggests that in the absence of in-person physician availability, virtually delivered primary care alternatives do not drive-up Ontario ED volumes. In the case of IVC, increased primary care attachment rates resulting from IVC may lead to decreased ED use in Renfrew County. As previously mentioned, the implementation of a VTAC in Renfrew County during the COVID-19 pandemic was found to be effective at reducing both ED visits and hospitalisations,⁶ suggesting that other virtual care models in Renfrew County, particularly IVC which provides primary care attachment, may have a similar effect. However, a population-based comparative study would be required to fully evaluate IVC's clinical (and economic) impact.

Primary care attachment is associated with better preventative care and chronic disease management and a lower risk of unmet healthcare needs.^{13,14} Therefore, it is likely that there would be some undiagnosed chronic disease among IVC patients, especially for individuals who were unattached for longer durations. This may explain why the prevalence of chronic diseases found in our sample of IVC patients [Table 1] appears low for a rural patient population in Renfrew County.⁶

The main goal of the IVC model is to increase attachment to comprehensive, team-based primary care with family physician leadership. To effectively work towards this goal, as well as to continually improve healthcare delivery, IVC must be evaluated over time using the internationally recognised Quadruple Aim Framework (improve population health, enhance patient experience, reduce costs and improve working life for healthcare workers).^{15,16} As a next step, an in-depth analysis of the patient experience using validated tools to measure patient satisfaction among a larger sample of IVC patients is warranted to identify areas of improvement in healthcare access, delivery and quality for patients. In addition, future study of the IVC provider experience is required to determine how healthcare quality can continue to be improved, while also preventing potential fatigue and burnout among IVC physicians.

Limitations

Our study population skewed young, with over 80% being under the age of 65 and was predominantly female (65%). This variance from the population of Renfrew County as a whole⁴ is likely due to the inclusion of families of military personnel based at the nearby Petawawa Garrison. It may not be representative of the rest of Renfrew County or other rural, clinical patient rosters. Therefore, study results may not be generalisable outside of our sample of Renfrew County IVC patients. In addition, this skewed distribution within the study population may have also influenced the lower prevalence of chronic disease found in our sample of IVC patients, as chronic diseases such as hypertension, COPD and heart failure, are more prevalent among male and older populations.^{17,18}

Due to the descriptive nature of this study, and because this study evaluated IVC within its initial months of operation, there is no direct clinical or temporal comparator for our results. Therefore, it is currently unclear if IVC provided better or comparable care to traditional in-person primary care among the study population. Future study of IVC's clinical impact in Renfrew County, as well as IVC patient and provider satisfaction is warranted to address knowledge gaps.

Consistent evaluation of IVC over time is key to ensuring that patients are satisfied and are receiving the best clinical care possible. With future studies planned to continue the evaluation and improvement of IVC across the Quadruple Aim Framework, IVC can be a genuine option to ameliorate the crisis of access to comprehensive, team-based primary care in Renfrew County and beyond.

CONCLUSION

During its initial 7 months of operation, Renfrew County IVC attached 790 patients, who did not previously have a family doctor, to a named physician and provided timely access to preventative care services. The results of this study will be critical for quality improvement and future development of IVC as it continues to expand, and more patients receive care in this way. Our results can be used to guide future clinical, economic and patient/provider experience evaluations of IVC and to support the adoption of the IVC model in other regions, particularly in rural, remote and underserved communities like Renfrew County.

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Conflicts of interest: Jonathan Fitzsimon is the Medical Lead for the Renfrew County Integrated Virtual Care. Judy Hill is the Executive Director of PCFHC. The authors declare that there are no other conflicts of interest.

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Pan-Canadian licensure: Potential impact on the rural physician workforce

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Abstract

Proposals to establish pan-Canadian licensure for physicians have broad support amongst medical groups to address physician shortages in underserved rural communities. The concept has also elicited concern from some stakeholders that its implementation could exacerbate rural physician workforce shortages by prompting an exodus of rural physicians to urban centres. An environmental scan of reports from key medical groups published within the past 10 years was conducted to determine factors influencing rural physician practice patterns. Data from membership surveys of the Society of Rural Physicians of Canada and the Canadian Medical Association – conducted in fall 2022 – were reviewed to determine whether licensure is a factor in rural physicians' decisions to leave or stay in practice in rural Canada. Factors contributing to physicians' decisions to leave rural practice identified in the environmental scan included lack of infrastructure support, inability to find locum coverage, inadequate support for team-based care and effects of high workloads on wellness. A common theme found in responses to the membership surveys was the recognition of licensing restrictions as barriers preventing rural physicians from practising in multiple provinces or territories. Survey respondents also voiced strong support for national licensure implementation. Pan-Canadian licensure holds promise as a strategy to enhance the recruitment and retention of physicians in rural communities. It could also provide physicians flexibility to work in multiple jurisdictions to address the health workforce needs of underserved communities.

Keywords: Health human resources, licensure, national licensure, national registration, pan-Canadian licensure, physician shortages, physician workforce

Résumé

Les propositions visant à établir un permis d'exercice pancanadien pour les médecins bénéficient d'un large soutien de la part des groupes médicaux afin de remédier aux pénuries de médecins dans les communautés rurales mal desservies. Ce concept a également suscité des inquiétudes de la part de certaines parties prenantes qui craignent que sa mise en œuvre n'aggrave les pénuries de médecins en milieu rural en provoquant l'exode de ces derniers vers les centres urbains. Une analyse environnementale des rapports des principaux groupes médicaux publiés au cours

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des dix dernières années a été effectuée pour déterminer les facteurs influençant les modes de pratique des médecins ruraux. Les données des enquêtes sur les membres de la Société de la médecine rurale du Canada et de l'Association médicale canadienne-menées à l'automne 2022-ont été examinées pour déterminer si le permis d'exercice est un facteur dans la décision des médecins ruraux de quitter ou de rester en pratique dans les régions rurales du Canada. Les facteurs contribuant à la décision des médecins de quitter la pratique rurale, identifiés dans l'analyse de l'environnement, comprenaient le manque de soutien en matière d'infrastructure, l'incapacité à trouver une couverture de suppléance, le soutien inadéquat des soins en équipe et les effets des charges de travail élevées sur le bien-être. Un thème commun ressorti des réponses aux enquêtes menées auprès des membres est la reconnaissance des restrictions en matière de permis d'exercice en tant qu'obstacles empêchant les médecins ruraux d'exercer dans plusieurs provinces ou territoires. Les répondants à l'enquête ont également exprimé leur soutien à la mise en place d'un système national de permis d'exercice. Le permis d'exercice pancanadien est une stratégie prometteuse pour améliorer le recrutement et la fidélisation des médecins dans les communautés rurales. Il pourrait également permettre aux médecins de travailler dans plusieurs administrations afin de répondre aux besoins en personnel de santé des communautés mal desservies.

Mots-clés: Ressources humaines en santé, autorisation d'exercice, autorisation d'exercer nationale, permis d'exercer pancanadien, enregistrement national, pénurie de médecins, effectifs de médecins

INTRODUCTION

Canada's publicly funded healthcare system is intended to provide medically necessary health services, as covered by provincial health insurance health plans, but results in inequalities in access to care in numerous underserved communities across the country. Many such communities are in rural and remote parts of Canada, and urgent calls for assistance occur regularly across the country to fill critical gaps in healthcare staffing in these locales. Qualified physicians from other provinces or territories who want to help, face burdensome licensure requirements, such as fees and time consuming paperwork, which often serve as deterrents. It has become common for emergency departments and obstetrical services across Canada to close for varying lengths of time when no coverage is available. Regions also tend to have small pools of locum physicians they can draw on, who are licensed to practise there.¹

Labour mobility requirements outlined in the Canadian Free Trade Agreement (CFTA) and applicable provincial/territorial labour mobility legislation allow individuals to apply to work in multiple jurisdictions.² Yet, physicians licensed in one province or territory who wish to practise in another currently face the additional burden of applying for licensure in that second jurisdiction; this serves as a barrier to anyone wishing to fill locum vacancies seamlessly or to include working in an underserved community outside their home

province or territory as part of their regular practice.

To improve access to care in these communities, a pan-Canadian approach to medical licensure has been proposed. Pan-Canadian licensure is defined as the ability of physicians with full licenses to practise independently without restrictions – or for medical resident trainees registered in any Canadian province or territory to practise or train in any other – without having to acquire more than one license or pay additional licensing fees³ (Pan-Canadian licensure is used interchangeably here with national licensure.).

In May 2022, the Society of Rural Physicians of Canada (SRPC) hosted a virtual dialogue with other national medical groups that revealed a broad agreement that this issue is a high priority. The dialogue also resulted in a call for a national approach to licensure to address health human resource shortages. One question about pan-Canadian licensure that elicited concern from some stakeholders was whether its implementation could exacerbate existing physician shortages in rural Canada through an exodus of rural physicians to urban centres. In fall 2022, the SRPC and the Canadian Medical Association (CMA) developed and conducted separate membership surveys to assess members' views on national licensure.

The objectives of this review were to better understand factors that affect physicians' decisions to leave or stay in rural communities and to determine rural physicians' perspectives on national licensure.

METHODS

Environmental scan [Table 1]

The environmental scan addressed three questions:

- What are the factors that influence a rural physician's decision to leave their rural practice?
- What evidence is there for the view that pan-Canadian licensure will precipitate an exodus of physicians from rural areas?
- What has been the impact of the CFTA in supporting mobility?

Grey literature published between January 2013 and October 2022 was included in the environmental scan; the approach and information sources used are summarised in Table 1.

Review of membership survey data

In fall 2022, the SRPC developed its own

survey to be sent to its members who were informed by the findings of the environmental scan. The specific objectives of the survey were to determine whether licensure is a factor that affects rural physicians' decisions to leave or remain practising in rural communities and to understand members' views on existing licensure processes and the potential impact of pan Canadian licensure, were it to be implemented, on patient care, physicians and the healthcare system.

The SRPC's survey was open to its 5900 members, of whom 33% are physicians who self-identify as practising in rural communities (the SRPC is a voluntary professional organisation whose members include practising physicians, medical residents, medical students and allied healthcare professionals who practise or have an interest in rural healthcare. It should be noted that a substantial proportion of SRPC members are medical students and residents who reside in

Table 1: Environmental scan approach and data sources

Activity	Approach	Data sources
Literature review	<p>Undertake environmental scan to explore trends across Canada related to rural medical practise and licensure</p> <p>Review surveys and internal documents of key medical groups on</p> <ul style="list-style-type: none"> Member's experiences with rural practise and their relation to licensure Factors influencing medical resident's decisions not to practise in rural communities following rural training rotations or during the transition to practise Factors affecting the mobility of international medical graduates and Canadian medical graduates to practise in underserved rural communities across Canada <p>Review federal government reports (e.g. annual reports) on legislation related to internal trade (i.e. CFTA), specifically regarding the provincial and territorial application of federal legislation to facilitate the mobility of healthcare workers</p>	<p>Grey literature review</p> <p>Rural medical publications (e.g. <i>Canadian Journal of Rural Medicine</i>)</p> <p>CFPC Family Medicine Longitudinal Survey reports</p> <p>Royal College of Physicians and Surgeons of Canada</p> <p>National Physician Survey reports (Canadian Medical Association, Canadian Institute for Health Information)</p> <p>Canadian Association of General Surgeons</p> <p>Canadian Association of Emergency Physicians</p> <p>Canadian Post-M.D. Education Registry</p> <p>Canadian Resident Matching Service</p> <p>Resident Doctors of Canada</p> <p>Canadian Federation of Medical Students</p> <p>Physician Resources Planning Advisory Committee – Committee on Health Workforce (Health Canada)</p> <p>CFTA reports (not caselaw)</p>
Data collection	<p>Contact medical groups to request access to data sources related to licensure, if available</p> <p>Conduct inquiries on informal (unpublished) reviews on licensure through rural physician groups and rural family medicine education sites</p>	<p>SRPC/CFPC Rural Road Map Implementation Committee internal documents (unpublished), including environmental scan reviews with federal, provincial and territorial agencies on rural physician recruitment and retention programmes</p>
Consultation with select rural physician experts	<p>Conduct informal discussions with rural physicians who are lead researchers, educators and experts in rural physician workforce issues</p>	<p>Experts at rural health research departments with oversight of rural medical education and at rural physician recruitment and retention programmes from the University of British Columbia, the University of Saskatchewan, NOSM University, Dalhousie University and Memorial University of Newfoundland</p>

CFPC: College of Family Physicians of Canada, CFTA: Canadian Free Trade Agreement, SRPC: Society of Rural Physicians of Canada

urban locations during their education). An e-mail invitation to participate in an online survey was sent to all SRPC members on 03 November, 2022; the survey closed on 05 December, 2022.

The CMA developed its own survey with essentially the same goals. It was sent to all 63,141 members by e-mail and was conducted from 18 to 30 November, 2022.

In an initial report of the survey findings, the CMA conducted quantitative analyses, and the SRPC also conducted qualitative analyses of the data in aggregate and de-identified form. In this paper, we review select components of these data. Responses from individuals who self-identified as students were excluded in analyses of questions that were practice related.

RESULTS

Factors affecting rural practice

Twenty-five reports and papers were reviewed for the environmental scan. This included an extensive study⁴ (including unpublished research) on factors that affect the rural physician workforce led by the SRPC and the CFPC.⁵ This study involved more than 300 stakeholders and was executed in six components that included medical schools; family medicine residency programmes; rural speciality training programmes; federal, provincial and territorial government policymakers; rural and remote communities and indigenous communities; Health Canada-funded rural family medicine education projects and rural physicians. Commissioned by the CFPC, another small study led by researchers at the Memorial University of Newfoundland examined factors affecting physicians' choices to practise in rural communities.⁶ Much of this work led to the development of the Rural Road Map for Action,⁷ which included a key recommendation calling for the creation of a national locum license.^{7,8}

Factors physicians identified as having influenced their decisions to leave rural practice are summarised in Box 1.

Reports reviewed in the environmental scan did not specifically identify licensure as an issue. The possibility of national licensure had also not been raised in any probing questions or as a potential solution to factors that influence physicians' decisions to leave rural practice.

Review of the Society of Rural Physicians of Canada and Canadian Medical Association licensure survey results

Quantitative results

A total of 1147 members responded to the SRPC survey (response rate = 19%); 77% of respondents identified themselves as rural physicians practising either full time clinically, in an academic setting, or primarily as a locum.¹⁷ A total of 5022 members responded to the CMA survey (response rate = 8%).³

Key findings from both surveys are summarised in Table 2.

The SRPC survey also asked whether respondents had ever left rural practice to move to an urban or suburban practice. Of the 1009 respondents to this question, 71% answered no. Amongst those respondents who had left rural practice at one point or another ($n = 259$), the most common reasons given were: to be closer to family and friends (50%), to be closer to their spouse or partner (29%), to have a more attractive community or lifestyle (26%) and to have better education and professional development opportunities (21%). Respondents ($n = 43$) also provided written answers to this question outlining other factors that contributed to their decisions to leave: burnout owing to lack of support making rural practice unsustainable; having been offered a better job or work opportunities; the need for a better lifestyle for their family and inability to provide specialised services (e.g., anaesthesia) for their rural community.¹⁷ In the SRPC survey, 66% of respondents indicated they had considered practising outside their home provinces but had ultimately chosen not to owing to the burden of licensure requirements.¹⁷

Qualitative observations

Amongst respondents to the SRPC survey, 362 participants provided additional written comments on their perspectives on licensure. Their comments indicated overwhelming support for the implementation of national licensure. The following themes emerged from their observations:

- National licensure, by allowing interprovincial mobility, may help address rural physician

Box 1: Factors contributing to physician's decisions to leave rural practice

Inadequate levels of and access to support, funding and infrastructure for physicians seeking to establish or take over practices;⁹ feeling overwhelmed or overloaded by work and poor work/life balance¹⁰

Insufficient clinical courage or confidence required to practise full-scope comprehensive family medicine^{11,12}

Spouses unable to find jobs; high-quality day care and schools lacking for children and families unhappy due to cultural differences and lack of opportunities to integrate into the community^{9,13,14}

Desire to work in group practices rather than in isolation;¹³ in group practices, other physicians assist with community integration, provide psychological and emotional support and help with transitions from residency to independent practice

Burnout, lack of support for locum coverage¹⁵

Lack of readily accessible healthcare services (e.g. laboratory services), specialist referrals and transportation access for urgent care

Inability to practise full-scope, comprehensive family medicine due to limitations of community institutions (e.g. local hospitals without surgical capacity)¹⁰

Dissatisfaction with working environments,^{13,16} such as the lack of availability of turnkey practices that include team-based environments with collegial support

Table 2: Summary of responses to questions about licensure from the Society of Rural Physicians of Canada and Canadian Medical Association surveys

Survey responses	Percentage of respondents to SRPC survey (%)	Percentage of respondents to CMA survey (%)
The most common reasons given for applying for a license in another province or territory		
To provide locum services	76	39
To seek/explore adventure	53	40
To be close to family/friends	22	31
Better compensation	22	25
Educational opportunities and professional development	20	34
More attractive community or cultural diaspora	20	32
The most common obstacles encountered in applying for an additional license		
The overall complexity of the process to obtain a license	Not asked	77
Length of process to obtain a license	92	68
Cost of getting licensed	84	64
How would the implementation of national licensure affect practice (responses of 'somewhat likely' and 'very likely')		
Remain in Canada rather than seek opportunities abroad	75	74
Continue to practise part-time during retirement	69	69
Seek locum opportunities in other provinces or territories	78	63
Practise temporarily in rural or remote areas in other provinces or territories	77	56
Practise permanently in rural or remote areas in other provinces or territories	25	16

SRPC: Society of Rural Physicians of Canada, CMA: Canadian Medical Association

workforce shortages by facilitating physicians (including urban physicians) to practise in rural and underserved communities and to provide locum coverage

- Rural physicians who are semi-retired or retired currently have no or little intention to fill locums outside their home provinces due to licensure requirements
- Most respondents indicated administrative burdens (i.e., fees and paperwork) deter licensed physicians from seeking licensure in another province or territory

- Restrictive licenses, requirements and processes imposed by provincial and territorial medical regulators
- Separate provincial/territorial licensing requirements make it difficult to attract international medical graduates to Canada to work, whether in urban or rural communities
- National licensure may facilitate learning opportunities for rural physicians that would allow them to expand their knowledge and skill sets and to practise in more than one setting.

DISCUSSION

What factors influence rural physicians' decisions to leave rural practice?

Rural medical practice thrives when physicians can work with others – through networks of care and as part of teams – to provide comprehensive generalist care to patients.¹ Factors identified in our environmental scan that contribute to physicians leaving rural areas include poor infrastructure support, licensure issues and burnout. Decisions to leave rural practice may also spring from a lack of effective support for physical or psychological challenges in the workplace.¹⁸ Previous work has also shown that international medical graduates practising in rural areas who have met their conditional licensing requirements often choose to return to their home provinces (where their families reside) once they have fulfilled their contractual obligations of services.¹⁹ Furthermore, physicians' decisions to enter into rural family practice may be influenced more by personal preference (e.g., lifestyle and scope of practice) than by a desire to respond to where population health needs are the highest.^{9,17}

Would pan-Canadian licensure precipitate an exodus of physicians from rural areas?

There has been speculation that pan-Canadian licensure, if it was implemented, could lead to physicians fleeing some regions to work in provinces that offer more lucrative compensation strategies. In contrast, our review and comments of survey respondents suggest that national licensure would not precipitate an exodus of physicians from rural communities and instead has the potential to assist with rural recruitment and retention of physicians. National licensure could ease the mobilisation of rural physicians from one part of the country to another to help communities in need. For example, 78% of respondents to the CMA survey indicated that national licensure would support the rapid mobility of physicians to help with disaster and crisis response. Amongst reasons CMA survey respondents gave for considering seeking licensure in another province or territory, better compensation ranked sixth amongst the most common reasons; the top five reasons were: (1) seeking adventure, (2) providing locum services, (3) educational opportunities and

professional development, (4) more attractive community or cultural diaspora and (5) to be closer to family and friends.

In a similar survey conducted in 2020 by the Resident Doctors of Canada, 91.6% of medical residents supported the implementation of national licensure.²⁰ The Resident Doctors of Canada survey also revealed that 80.6% would likely seek temporary locum opportunities in provinces or territories outside their primary practise locations.

How has the Canadian Free Trade Agreement supported physician mobility?

The goal of the CFTA is to reduce barriers to labour mobility across provincial and territorial borders. In the case of the medical profession, the CFTA provides the right for a doctor who is licensed in one province or territory to apply for a license in another, but it does not automatically provide the right to practise there.²¹ Applicants must still apply for licensure in the second jurisdiction, pay any associated fees and navigate the time-consuming administrative burden imposed by regulatory requirements.

At best, the CFTA triggered alignment in some processes between provinces and territories, but it did not eliminate redundancies and inefficiencies related to separate licensing requirements.²²

Limitations and future research

Limitations of this study include that definitions of 'rural' and 'national licensure' vary amongst medical stakeholder groups, and the SRPC did not provide a definition of what constitutes a rural practice or community in its survey. National and provincial physician databases report different types of information on physician supply, and few consistently provide details on physician demographics, where they work, or scopes of practice, which are crucial for workforce planning and informing policy. The robustness of forecasting tools that provinces and territories use to guide planning varies, with some having minimal abilities to factor in elements of system needs, physician workload trends and licensure barriers and issues. This variation points to a need to reach a consensus on terminology and approaches to be able to create reliable and useful predictions about the physician workforce.

CONCLUSION

To date, national licensure for physicians has not been included as part of rural health human resource strategies to enhance access to care in underserved communities in Canada. The findings presented here confirm that existing licensure frameworks hinder efforts to improve access to care for rural populations by discouraging physicians from seeking licensure in a second province or territory. Our survey results indicate that Canadian physicians see national licensure as having the potential to increase the physician workforce in underserved rural communities. No evidence was found to substantiate the fear that national licensure would spark an exodus of rural physicians from their current locations. Rather, by facilitating workforce mobility, it has the potential to combat barriers to rural practise and to decrease regional inequities in access to care.

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In situ clinical education of frontline healthcare providers in under-resourced areas: A rapid review

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Abstract

Rural communities are geographically isolated from large urban areas, affecting access to definitive care, specialists and other health services that only service urban areas. Rural decision-makers are often faced with numerous challenges regarding the availability, capacity, sustainability and performance of health systems in rural and remote areas. We evaluated the current body of literature on educational initiatives being used in under-resourced areas to increase the knowledge or skills of healthcare workers. This rapid review followed the methods laid out by the Cochrane Rapid Reviews Methods Group and included published articles from any of three databases that described and evaluated an educational intervention, in which healthcare workers were the learners and which took place in an under-resourced area. Papers were excluded if they were deemed to be too resource intensive, were an opinion or concept paper or took place in an urban area. Results were synthesised descriptively. Ten studies were identified that contained information on educational initiatives in a variety of countries. The healthcare workers targeted in the studies varied from physicians, nurses and midwives to community health workers and students. The quality of studies also varied and included randomised control trials, systematic reviews and both prospective and retrospective studies. Initiatives involving simulation or point-of-care ultrasound were most common and showed the most benefit to a learner's knowledge and skill development. A limited body of literature exists on educational initiatives for healthcare workers in under-resourced areas. While simulation and hands-on learning showed positive results, the opportunity remains for a low-cost, high-yield educational initiative tailored to the unique needs of healthcare workers in under-resourced areas.

Keywords: Education, frontline, healthcare provider, remote, rural, training, under-resourced

Résumé

Les communautés rurales sont géographiquement isolées des grandes zones urbaines, ce qui affecte l'accès à des soins définitifs, à des spécialistes et à d'autres services de santé qui ne desservent que les zones urbaines. Les décideurs ruraux sont souvent confrontés à de nombreux défis concernant la disponibilité, la capacité, la durabilité et la performance des systèmes de santé dans les zones rurales et

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éloignées. Nous avons évalué l'ensemble de la littérature actuelle sur les initiatives éducatives utilisées dans les zones sous-dotées pour améliorer les connaissances ou les compétences des travailleuses et travailleurs de la santé. Cette examen rapide a suivi les méthodes définies par le Cochrane Rapid Reviews Methods Group et a inclus des articles publiés dans l'une des trois bases de données qui décrivaient et évaluaient une intervention éducative dans laquelle les travailleuses et travailleurs de la santé étaient les apprenants et qui SE déroulait dans une zone manquant de ressources. Des articles jugés trop gourmands en ressources, des opinions, des documents conceptuels ou en lien avec des zones urbaines, ont été exclus. Les résultats ont été synthétisés de manière descriptive. 10 études ont été identifiées, contenant des informations sur des initiatives éducatives dans divers pays. Les travailleurs de la santé ciblés dans les études variaient des médecins, des infirmières et des sages-femmes aux travailleurs de la santé communautaire et aux étudiants. La qualité des études était également variable et comprenait des essais contrôlés randomisés, des revues systématiques et des études prospectives et rétrospectives. Les initiatives impliquant la simulation ou le POCUS étaient les plus courantes et présentaient le plus d'avantages pour le développement des connaissances et des compétences de l'apprenant. Il existe un nombre limité de documents sur les initiatives éducatives destinées aux travailleurs de la santé dans les zones sous-dotées. Bien que la simulation et l'apprentissage pratique aient donné des résultats positifs, il est toujours possible de mettre en place une initiative éducative peu coûteuse et à haut rendement, adaptée aux besoins spécifiques des travailleuses et travailleurs de la santé dans les zones sous-dotées.

Mots-clés: Formation, éducation, rural, éloigné, manque de ressources, première ligne, prestataire de soins de santé

INTRODUCTION

A globally recognised challenge is the geographical maldistribution of the health workforce between rural and urban areas. A multipronged approach is needed to address this complex problem, and understanding the impact of interventions is key to being able to scale them up.¹ Rural communities are geographically isolated from large urban areas, affecting access to definitive care, specialists and an array of health services that only service urban areas.² The 2010 global policy guideline produced by the World Health Organization (WHO) issued recommendations for increasing access to health workers in rural and remote areas through four main areas – education, regulations, financial incentives and personal/professional support. Although most data come from high-income countries, it does suggest that interventions that target these areas can influence the retention and the effectiveness of healthcare workers in rural and remote areas.¹

Conventionally, staff shortages and gaps in access to care are addressed by increasing recruitment of healthcare workers; however, the comprehensive costs of this practice are often underestimated and encompass not only the visible costs of advertising, orientation and training but also the hidden costs of temporary staffing and the damage to staff morale and stability. Retention

has many benefits aside from cost-effectiveness, including increased opportunity for mentoring, increased institutional memory amongst staff and a knowledge base that grows at a faster pace with experienced, long-term employees.³ Multiple sources cite access to continuing education and organisational support for on-the-job learning and skill building as a key contributor to job satisfaction ratings amongst health workers and to higher patient satisfaction.^{1,3,4}

This rapid review sought to evaluate the current body of literature on what educational initiatives may be being used in under-resourced areas to increase the knowledge or skill sets of the health workers in those communities.

METHODS

Rapid reviews are becoming increasingly popular and influential within the health sector. Policymakers require evidence to inform decisions and those decisions often need to be made quickly and with limited resources. More recent studies have shown that decision-makers want answers to their questions to be completed quickly, in days or weeks rather than months or years, and to be accurate and affordable.⁵ Recently, a set of methods for conducting rapid reviews has been agreed upon by the Cochrane Rapid Reviews Methods Group, primarily in response to the

need for fast and accurate information during the COVID-19 pandemic.⁵ When conducting this review, the recommendations from the Cochrane Rapid Review Group were followed – refining of the research question, setting eligibility criteria, searching and study selection, data extraction and synthesis.⁶ The inclusion and exclusion criteria and the search strings were developed and agreed on by two reviewers.

Inclusion criteria included English language results, human learning, papers that describe and evaluate a specific educational intervention and healthcare providers as learners. Exclusion criteria included opinion or concept papers, programmes that were too resource intensive or a population that was not under-resourced.

The following search strings were entered into the Cochrane, PubMed and Embase databases: (*in situ* OR mobile OR ‘point of care’) AND (simulation OR training OR education) AND (rural OR remote OR ‘under resourced’) AND (frontline OR ‘health care provider’ OR nurse OR doctor). A date limit of 20 years was put on the search. This time frame was chosen specifically to account for the approximated implementation gap of 17 years in health research.⁷ The 20 year date limit allowed the search to capture any research that was done, implemented, and evaluated while taking into consideration the time lags that occur within the research translation process.

Abstracts were screened by both reviewers, to yield articles for data extraction and synthesis which were done by one reviewer, and using the approach consistent with rapid reviews, a descriptive synthesis was completed without additional meta-analysis.⁵

RESULTS

Our searches returned 331 hits [Figure 1], and we identified ten relevant studies [Table 1], which came from several different countries, many of which are low and middle income.⁸ The healthcare workers targeted in the studies varied from physicians, nurses and midwives to community health workers (CHW) and students. The quality of studies also varied and included randomised control trials, systematic reviews and both prospective and retrospective studies.

The educational interventions that were studied ranged in type, length and topic area.

The majority of the included papers focussed on point-of-care ultrasound (POCUS) and simulation training as the intervention, with a similar variety of evaluation methods.

Simulation training

Two of the included articles centred on simulation training, specifically for medical students and student doctors (medical residents), and both used an Objective Structured Clinical Examination (OSCE) style evaluation method. In both papers, the intervention group who received the simulation training scored higher on their OSCEs than the control group.

Bhattacharyya *et al.*⁹ discuss interactive simulation with junior orthopaedic surgery residents in the UK. Participants were assessed in a mobile simulation operating theatre with high-fidelity femur models and nailing instruments. Residents were assessed after simulation training through an OSCE format, which showed significantly better scores in the simulation group. Morato *et al.*¹⁰ trained final-year medical students on their paediatric rotation in Brazil. All trainees received Choosing Wisely training – an initiative launched by the American Board of Internal Medicine to encourage dialogue about the costs and benefits of medical care. Some students then received *in situ*, role-playing simulation followed by an OSCE evaluation. As with Bhattacharyya *et al.*,⁹ the simulation group scored significantly higher than the control group.

Point-of-care ultrasound training

Four of the ten papers discussed POCUS training, with a variety of specific foci – prenatal, abdominal, chest and Focused Assessment with Sonography in Trauma. Three were studies that took place in low- or middle-income countries, and one was a systematic review. All four papers showed positive results, though one focussed solely on the increased uptake of the procedure by the learners over the quality of the images or the diagnostic capabilities of the healthcare providers. The training ranged from 3 h to several years in the review paper and 30 days, 12 months and two years in the other three papers. In the case of Stolz *et al.*,¹¹ the intervention was part of an upskilling programme that covered background knowledge, anatomy and technique,

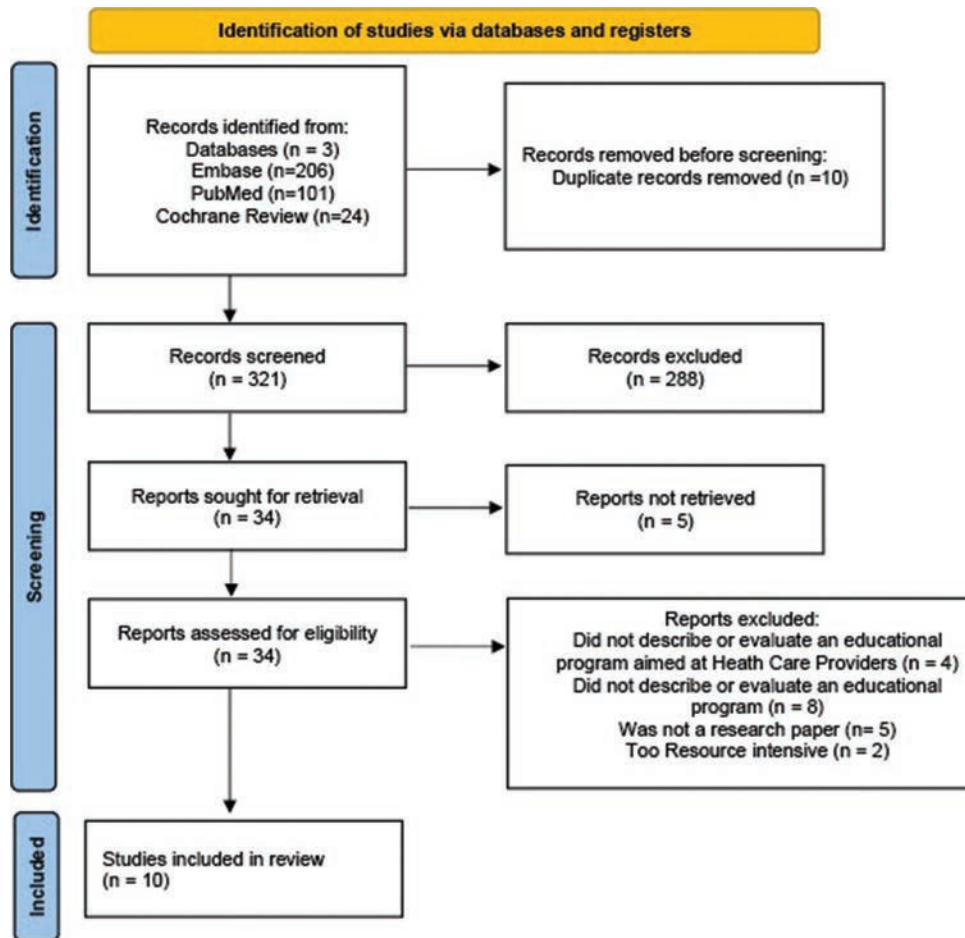


Figure 1: PRISMA flow diagram.

using lectures, hands-on demonstration, mentoring and examinations to nurses in Uganda. This paper reported on uptake instead of the quality of images or accuracy of diagnosis; however, this particular setting had extremely low healthcare provider to population ratios and highlighted the difference between POCUS examinations (2185) and radiological examinations (750) during the study timeframe. This was seen as a positive step to improved patient care and the authors noted that the examination results were positive in 46% of the cases, likely due to the high acuity of the patients, further highlighting the need for an accessible imaging modality.

Sabatino *et al.*¹² similarly, trained CHW in Sierra Leone through a Nongovernment Organization (NGO) that offered voluntary medical assistance to train the CHWs. They noted success in both identification of anatomy, general knowledge scores and inter-observer agreement with physicians. They further pointed out that only 220 million people out of a population of 5 billion in developing nations have access to

basic radiological services and highlighted the convenience, portability and relative ease of use of POCUS in the developing world.

Rominger *et al.*¹⁵ conducted their study in Mexico with physicians, based on rural health clinics that were part of a regional collective. Ultrasound is the only imaging modality available in this region of Mexico, with the nearest radiological centre anywhere from 2 to 6 h away. The instructors who trained them in POCUS were faculty from the University of Louisville and Harvard University in the United States. This programme also demonstrated success, with only 4.3% of the scans resulting in a disagreement in findings, and in 34% of the patient encounters, POCUS changed the clinical diagnosis which, according to authors, likely expedited care without having to wait for additional imaging.

Finally, the review article¹⁴ analysed articles that included mostly multidisciplinary groups of trainees. Training programmes varied in length, were intended for bedside application on prenatal patients, and trainees were evaluated using a

Table 1: Papers meeting inclusion criteria (n=10)

Study ID	Country	Study type	Healthcare provider targeted	Number of participants	Educational intervention	Outcome
Bhattacharyya <i>et al.</i> , 2021 ⁹	UK	Double-blinded RCT	Orthopaedic surgeons (junior residents)	14	Simulation training Cognitive task analysis/distributed interactive simulation (a real-time interactive simulation) Participants were assessed in a simulation mobile operating theatre with high-fidelity femur models and nailing instruments	Significantly better scores for the intervention group (49 vs. 17)
Bidner <i>et al.</i> , 2022 ¹⁴	N/A	Review	33% medical physicians, 19% nurses and midwives, 52% multidisciplinary	903 across 27 studies	POCUS Ultrasound training programme intended for point-of-care or bedside application on prenatal patients Could have been part of a broader training curriculum Programme duration varied significantly (3 h to several years) Evaluation methods included pre- and post-training tests, knowledge assessments, written tests before practical training, OSCE assessments, expert image review	Half the studies lacked the follow-up support/training important to the safe ongoing practice of PoCUS Findings were generally positive, reporting improved knowledge and competence
Gill <i>et al.</i> , 2016 ¹⁵	Australia	Three-armed RCT (control vs. 2 different mCME intervention)	Community-based physician assistants	592 (completed)	SMS messaging SMS bullet point knowledge (Group 2) and SMS multiple choice question with response (Group 3)	High satisfaction from participants, but no improvement in follow-up tests or job satisfaction
Eddy <i>et al.</i> , 2016 ¹⁶	Australia	Systematic review		7 papers included	Teamwork programmes Data synthesis of qualitative studies regarding health professional's experience of teamwork education programmes	A range of factors that influence experience Key takeaway: Go beyond the focus on specific teamwork education programmes and view them instead as part of a more complex environment The six synthesised findings included: Organisational culture and expectations understanding the functioning of successful teams; the experience of the education is influenced by their starting point; teamwork education is highly valued; high fidelity

Contd...

Table 1: Contd...

Study ID	Country	Study type	Healthcare provider targeted	Number of participants	Educational intervention	Outcome
Morato <i>et al.</i> , 2022 ¹⁰	Brazil	Prospective	Final-year medical students in paediatric rotation/clerkship	50	Simulation training in paediatrics Remote video class versus <i>in situ</i> simulation training. Outcome tested in an OSCE	simulation provides a powerful learning opportunity, and this education provided increased confidence and motivation Simulation group was significantly higher scoring than the control group
Rominger <i>et al.</i> , 2018 ¹³	Mexico	Longitudinal	Rural clinic physicians	Not specified - 10 clinics, with 584 ultrasounds completed and evaluated	POCUS training 12 months curriculum, 4 teaching sessions (lecture and hands-on), practising on healthy volunteers and patients	34% of patients had a change in diagnosis, and 30% had a change in management – taken to mean POCUS training was helpful
Sabatino <i>et al.</i> , 2020 ¹²	Sierra Leone	Prospective	CHWs	2	POCUS training Trainees were evaluated on performing E-FAST and POCUS (chest and abdominal) correctly Training course lasted 30 days	Trainees were able to recognise the abdominal organs (with minor difficulties) Highest scores obtained in the hepatic spaces and pelvis
Sabin <i>et al.</i> , 2017 ¹⁷	Vietnam	RCT	Community-based physicians assistants	638 participated in the intervention and 70 participated in the in-depth evaluation	SMS messaging Daily SMS text message that contained either a simple message related to primary care or a four-option multiple choice question which required a reply. Those in the latter group got an immediate response indicating whether the message was correct or not Both groups received messages that covered six topic areas: Surgery, internal medicine, paediatrics, infectious diseases, sexually transmitted infection and family planning Messages were sent in random order Intervention lasted 6 months and was evaluated through focus groups discussions and in-depth interviews with some participants (70)	Qualitative descriptors of the intervention Pros included convenience, relevant content, desire to continue and perceived improvement in knowledge/skills Cons included lack of depth or detail in the messages, irrelevant or difficult content, lack of interactivity and technology challenges

Contd...

Table 1: Contd...

Study ID	Country	Study type	Healthcare provider targeted	Number of participants	Educational intervention	Outcome
Sagi <i>et al.</i> , 2018 ¹⁸	India	Prospective	Primary care physicians	38	Varied Phase 1: 10 days of in-person training, including patient interviewing skills, drug dependence knowledge, and assessment and treatment of drug disorders Phase 2: Both synchronous tele-conference training sessions and smartphone app e-learning (providing knowledge and skills) Finally, participants were tested and given various questionnaires	They found a significant improvement over time Self-confidence improved in 32%, whereas the rest felt the same as before Satisfaction: 22% improved from baseline, 51% reported the same level of satisfaction (and were above 5 on a 1–10 Likert Scale), and 16% reported the same level of satisfaction (and were below 5 on a 1–10 Likert Scale) Authors determined that telementoring could be helpful for future training of primary care physicians in mental health/addiction management
Stolz <i>et al.</i> , 2015 ¹¹	Uganda	Retrospective review	Nurses	13	POCUS Lectures were delivered as part of a 2 years up-skilling programme, covering background knowledge, technique, anatomy, pathology, etc., Some hands-on, demonstration, proctored exams, etc., were supplied. Further support was provided by mentoring from experienced nurses and visiting physicians	Report on uptake of procedure, rather than focussing on improvement in skill. A total of 2185 POCUS assessments were completed, with a gradual increase in usage shown over the course of the nurse's training

RCT: Randomised control trial, OSCE: Objective structured clinical examination, mCME: Mobile continuing medical education, E-FAST: Extended focused assessment with sonography in trauma simulation training, POCUS: Point-of-care ultrasound, N/A: Not available, CHWs: Community health workers

variety of methods, including pre- and post-tests, knowledge assessments, OSCE assessments and image reviews by experts. Although the authors found that half the studies lacked the follow-up support that was critical for the safe, ongoing practice of POCUS, results were generally positive, with studies reporting improved knowledge and competence.

The final four studies included two randomised controlled trials using SMS text messages, a systematic review of teamwork programmes and a varied programme that combined in-person training on a variety of interviewing, assessment and treatment skills and teleconference and

e-learning app training. Gill *et al.*¹⁵ and Sabin *et al.*¹⁷ both assessed the efficacy of SMS text messages that contained medical information on a variety of topics, to community-based physician assistants in Australia and Vietnam, respectively. Both studies showed high satisfaction with the intervention, with participants citing convenience, relevant content and perceived improvement in knowledge and skills. However, there was no actual improvement noted in follow-up tests or job satisfaction.

Sagi *et al.*¹⁸ reported on a tele-mentoring programme in India targeting Primary Care Physicians and consisting of both synchronous and asynchronous components. The topic focus was

the detection and early intervention of substance misuse disorders. Authors found a significant improvement over time in self-confidence and satisfaction and determined that tele-mentoring could be helpful for future training.

Eddy *et al.*¹⁶ reviewed teamwork programmes by analysing seven qualitative studies that looked at health professional's experience with teamwork education programmes. In healthcare, teamwork is essential to delivering high-quality patient care, and as no one professional can deliver all the healthcare that a patient needs, those with specific expertise must work together. This review focussed on the experiences of health professionals in acute hospital settings in Australia who participated in teamwork education programmes. Results of the review highlighted six key findings that influence the experience of teamwork education, including organisational culture, understanding team dynamics, the value of education, simulation as a learning opportunity, the influence of educational starting points and increased confidence and motivation with education. The key takeaway from this review was the need to move away from focussing on specific teamwork educational programmes and view them instead as part of a more complex environment.

Of special note was a paper from the Society for Academic Emergency Medicine Virtual Meeting in 2021. The paper by Wetzel¹⁹ discussed The Bridge to Emergency Medicine curriculum, an open-access, flipped classroom curriculum targeting fourth-year medical students planning to enter an emergency medicine residency, to prepare them with essential knowledge and skills in the field. Although this paper did not evaluate the educational outcomes of the learners, nor was it specific to under-resourced areas and so was not included in this review, the programme remains ongoing and could be used as a model for online medical education, particularly in rural and remote environments where expert-led, in-person training could be more difficult to facilitate.

DISCUSSION

Educational programmes from a variety of countries show that there is some effort to increase the body of knowledge and skill acquisition of rural and remote healthcare providers. Most of the interventions in our review centred on

POCUS, which is known to be increasing in use in many areas of healthcare,²⁰ and from as far back as 1985, the WHO was recommending its use in developing countries, citing improved patient management where ultrasound may represent the sole radiologic service.²¹ Simulation and hands-on practice were similarly popular ways of educating, and in our review, they were used both as the sole intervention and as part of a larger programme. Simulation training has been shown to be beneficial for many professions, including military personnel and pilots, and is often used by personnel from various health disciplines.⁸ It is considered an effective training method with improvements usually noted in knowledge, skills and behaviours.¹⁰

Significant differences exist between rural and urban populations and rural decision-makers are often faced with numerous challenges regarding the availability, capacity, sustainability and performance of health systems in rural and remote areas.²² For the past 30 years, there has been an increasing emphasis on basing clinical practice on the best available evidence to ensure the best possible outcomes for patients. Several landmark reports and studies in the early 2000s called attention to patient safety and quality care and a key component that came from these reports is the understanding that quality care is knowledge based. National databases such as the Canadian Institute for Health Information contain many examples of inadequate or unnecessary practices in Canada and studies from the US, the Netherlands and Australia have shown that up to 50% of patients may be getting ineffective care.²³ In low- and middle-income countries, more than 8 million deaths are attributed to poor quality of care – something that can be improved by healthcare workers who are able to work at their optimal capacity, within strong, knowledgeable teams. Safe staffing and education, both pre-service and ongoing, correlate with patients' reduced length of stay and lower incidence of adverse events and overall mortality.¹

It is worth noting as well that the COVID-19 pandemic forced either the cancellation of continuing medical education or the fast move into the virtual sphere. Although this was necessary, the drawbacks in terms of networking, time zone differences and technical difficulties were felt across all sectors. Nonetheless, a poll conducted

by Nature of over 900 of their readers indicated that virtual educational opportunities such as meetings and conferences were valued, citing the increased access to information regardless of physical location, decreasing travel costs and lowering the carbon footprint of the attendee.²⁴ As climate change is unquestionably linked to health, particularly in under-resourced areas,²⁵ the move to virtual could facilitate both increased access to information for those working in under-resourced areas as well as help lessen the environmental impact of continuing education.

The COVID-19 pandemic has provided the healthcare community with a unique opportunity to rethink pre-pandemic educational practices. The early success of peer-to-peer support programmes developed in Ontario and British Columbia, which allow practitioners in rural and remote environments to connect with specialists or more experienced providers for support and assistance, indicate an eagerness to engage in programmes that are practical, patient-centred and accessible.²⁶

While our results are valuable, there is a lack of generalisable models that could be used to develop an educational curriculum for rural and remote healthcare providers. Much of the literature in our review reported on initiatives based in low- and middle-income countries and included smaller sample sizes and used NGOs or volunteers as the instructors of the interventions. The delivery of healthcare is complicated by increasing numbers of patients who present with complex conditions, increasing numbers of patients with chronic diseases and constant organisational or structural changes to healthcare systems,¹⁶ all of which have been exacerbated by the COVID-19 pandemic, in addition to global shortages of nearly all healthcare professions.²⁷

To match the current and upcoming needs of all health systems, particularly vulnerable under-resourced systems, significant investment in continuing education and training is required. The WHO is clear – investment in education is key to building leadership and management capacity, optimising return on investment and accelerating and sustaining jobs.¹

According to data extracted from the WHO's National Health Workforce Accounts, in 2020, there were 65.1 million health workers, tallied from numbers of doctors, pharmacists,

dentists, midwives, nurses and others. Of these available health workers, one-fifth of the world's population has access to nearly half of these health professionals, with an estimated current global shortage of 15.4 million and an estimated global shortage projected for 2030 of 10.2 million.²⁸ This highlights the need for investments in the healthcare workforce, particularly in under-resourced areas, especially given the effects of the COVID-19 pandemic on health workers across the globe.

The COVID-19 pandemic forced innovation in shifting some face-to-face patient care encounters to a virtual delivery model, with emerging evidence that this was effective. There is a similar opportunity now for continuing medical education and the development of low-cost, high-impact educational interventions that can be tailored to the unique needs of the rural, remote and under-resourced healthcare providers. Increasing the educational opportunities of these healthcare providers will work to increase a collective knowledge base specific to these areas, contribute to job satisfaction and retention and ultimately improve patient care.

Limitations

As with all Rapid Reviews, speed was prioritised over comprehensiveness. The lack of involvement of stakeholders in developing a protocol was a clear limitation and was done in the interest of time and resources. Topic refinement and protocol development were guided by topic literature and background information. In this review, using three databases and including articles from the previous 20 years was intentionally chosen to be as thorough as possible within the limits of a rapid review. Limiting to English language studies only could have led to missed articles, especially given the high number of included studies that took place in countries where English is not the primary spoken language. Due to the ongoing nature of the COVID-19 pandemic, it is likely that there are educational initiatives that would be accessible to practitioners in under-resourced areas that were not included in this review. These were all limitations that were balanced with the timely need for a review of this topic, and the limited resources that are afforded to rural and remote areas globally.

CONCLUSION

Despite an extensive search over a long period, the body of literature on educational initiatives in under-resourced areas is remarkably small and incomplete. This is more likely due to the focus being on the rural and remote environment where resources, both human and financial, are much lower than in urban areas, rather than indifference on the part of researchers. This review suggests that hands-on or simulation-style learning is generally well received and produces positive results in both knowledge and skills.

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The Occasional frostbite

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INTRODUCTION

While cold weather injuries and frostbite in particular are uncommon, rural Canadian physicians are likely to occasionally be confronted with a severe frostbite injury. Previous approaches to frostbite in the Canadian North have centered on amputation, however, recent care has been influenced by efforts to modernise the treatment.

Frostbite injury occurs in two phases. The first is a freezing injury characterised by extracellular ice crystal formation leading to osmotic changes compromising cell membranes: A cascade ultimately resulting in endothelial injury and tissue freezing. The second phase may be described as a reperfusion injury with release of vasoconstricting metabolites of arachidonic acid such as thromboxanes. Ultimately, ischaemia may occur as a result of distal vascular microthrombi and vasoconstriction. Advanced therapeutics such as the vasodilator iloprost and thrombolytics such as tissue plasminogen activator (tPa) are directed primarily to this second phase. In this article, we will describe the basics of frostbite pathophysiology, grading and evidence-based treatment based on available resources.

HISTORY AND DEMOGRAPHICS

Historically, frostbite was predominantly reported among military personnel. Napoleon Bonaparte's military surgeon, Baron Domonique Larrey, first described the pathophysiology of the condition following the condition's devastating impact on their army in 1812.¹

Two populations have seen an increasing incidence of frostbite over the past four decades: Extreme adventurers and those of low socio-economic status.² With increasing interest and accessibility of outdoor recreation in cold environments, those with limited experience and/or inadequate preparation are at risk for developing frostbite. The British Antarctic Survey found an incidence for cold injury of 65.6/1000/year; 95% of which was for frostbite, with recreation being a risk factor.³ A cross-sectional questionnaire of Iranian mountaineers found a mean incidence of 366/1000 population per year.⁴ In our group's own case series of patients presenting to Whitehorse General Hospital with frostbite, 45% of cases were related to extreme winter recreation. Other risk factors amongst adventurers

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are dehydration, high altitude, hypoxia and exhaustion.⁵

In marginalised populations, homelessness, drug/alcohol use disorders and mental health diagnoses are the significant risk factors for frostbite. A retrospective cohort study of Minneapolis frostbite patients between 2016 and 2017 found that of 1065 frostbite patients, 67.1% had a diagnosed alcohol/drug use disorder and 35.4% were underhoused. Both risk factors were predictive of having multiple readmissions following initial presentation. As well, 21.4% of patients had a mental health diagnosis.⁶ A 12-year retrospective review of frostbite patients in Saskatchewan had similar results, with 46% of patients describing alcohol consumption, 17% with a psychiatric disorder and 4% with documented recreational drug use.⁷

PRESENTATION

Cold weather injuries have a spectrum of presentation, ranging from frostnip to frostbite. Frostnip is the earliest form of cold weather injury, described by numbness and pallor without associated tissue freezing.⁸ Chilblains (pernio) are cold weather injuries that are milder than frostbite, caused by repetitive humid cold exposure at non-freezing temperatures [Figure 1]. It often presents as pruritic or painful skin changes.⁹

Frostbite itself is characterised by tissue freezing, causing vasoconstriction leading to ischemia and local tissue damage. The common presentation includes skin changes and changes in sensation, such as paraesthesia or anaesthesia, with severe pain and blister formation following rewarming of the tissue. Over 90% of frostbite occurs on the hands, feet and face. Severity of the injury appears to depend on the length of exposure, absolute temperature, wind chill, humidity, clothing quality and patient factors such as microvascular disease.¹⁰

GRADING

The diagnosis and determination of the extent of frostbite is often clinical. Many frostbite injuries appear similar at the time of presentation, and thus, should be classified following rewarming. Prognosticating frostbite has proven to be a challenge, as the true extent of the tissue damage may only become evident 3–6 weeks post-injury.¹¹

Historically, frostbite has been classified using an analogous system to degree of burn: Frostnip, first degree, second degree, third degree or fourth degree according to the depth of the injury. While this system accurately describes the wound after rewarming, it is poor in predicting the extent of tissue damage, and thus, provides limited prognostic value.¹² Another, simpler system classifies injuries into either superficial or deep, with the intention that deep injuries are predictive of tissue loss.¹² Similar to the burn classification, this system does not reliably predict the prognosis. Cauchy *et al.* proposed a four-grade system for frostbite on the hand or foot that classifies the injury as it extends more proximally up the digit, as opposed to the depth.¹¹ In a retrospective analysis of 70 cases, they used bone scans and ultimate amputation levels to propose a classification scheme. While this system is not prospectively validated, it appears to correlate well with the findings on bone scan and amputation rates. It reflects the fact that as the cyanotic injury progresses proximally the risk of amputation increases. The value of this system is that it provides early prognostic data and may better indicate the risk of a functionally important amputation compared to the other scoring systems. In our experience, the Cauchy grading system is the easiest for clinicians to use to guide therapy. In the absence of advanced imaging, grading the case as the proximal extent of cyanosis or haemorrhagic blistering post-rewarming is recommended [Figures 2 and 3].

A valuable visible tool [Figure 2] for clinicians can be posted in an emergency department.¹⁵

In Figure 3 the thumb is clearly just grade 2, while one could see how both the index and long



Figure 1: Chilblains.

finger have cyanotic changes abutting the middle phalanx so arguably a 3. The ring finger is more convincingly a grade 3 with cyanosis and likely haemorrhagic blister into the middle phalanx. The fifth finger has unquestionably cyanosis and haemorrhagic blistering into the middle phalanx, so a solid grade 3.

Diagnostic imaging

While work continues in developing the optimal imaging modality to aid in directing frostbite treatment, there is as yet no consensus. Research protocols will ideally clarify the roles of radiography, computed tomography, magnetic resonance imaging, bone scintigraphy and fluorescent microangiography.^{8,14-19} Currently, the rural practitioner is best to use the clinical grading system developed by Cauchy to direct therapy. In the rural setting, no imaging is required to evaluate and treat frostbite.

MANAGEMENT

Rapid rewarming

Optimal frostbite treatment begins with immediate management of hypothermia, followed by active rapid rewarming while avoiding freeze-thaw-refreeze cycles.²⁰ Active rapid rewarming, useful for partially frozen or frozen tissue, consists of water maintained at 37°C–39°C and actively circulated around the frozen tissue.²¹ If an available hot water source is in the range of 36°C–40°C, this may be acceptable. Rewarming is complete when the tissue is soft and pliable to touch; the tissue may appear ecchymotic. Duration of rewarming varies based on affected tissue but takes approximately 15–30 min.¹² Rewarming is often painful and should be accompanied by individualised acute pain management, often with opioids.¹⁰

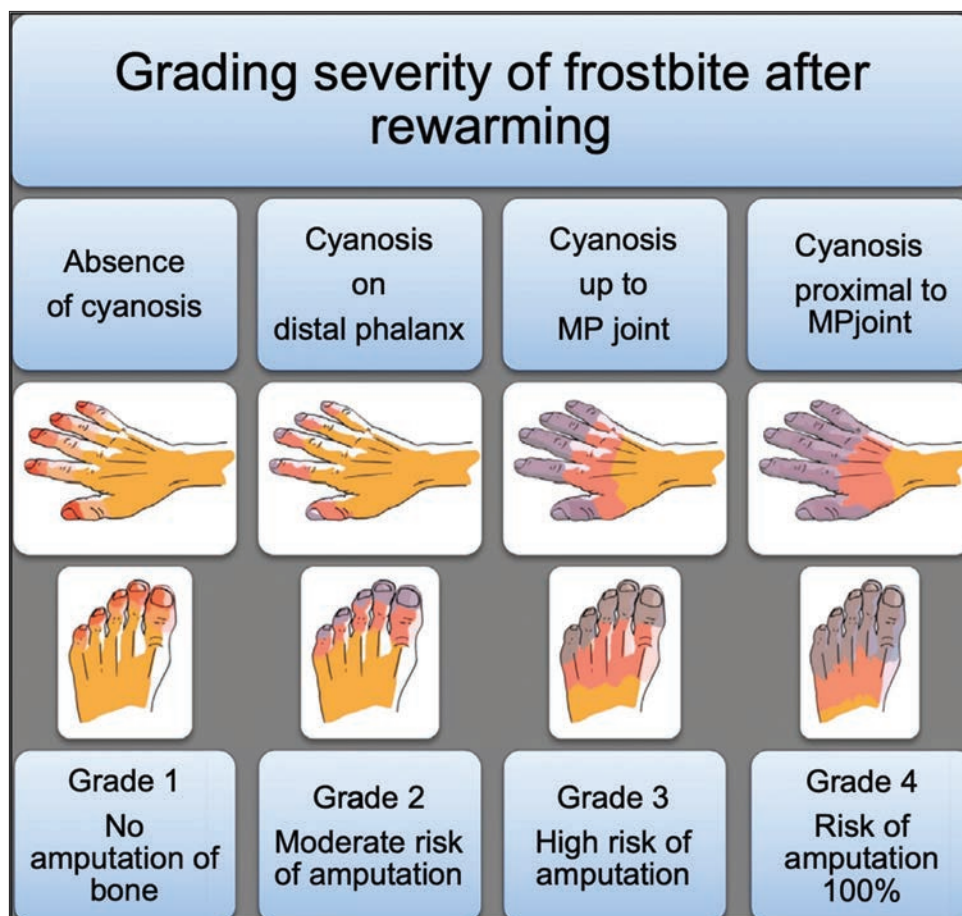


Figure 2: Grading of severity of frostbite and bone amputation risk after rewarming. Reprinted with permission from Elsevier. www.sciencedirect.com/science/journal/wilderness.



Figure 3: Grading injuries based on the most proximal level of cyanosis or haemorrhagic blistering.

Wound management

Large bullae should be drained or debrided with aseptic technique if they interfere with joint movement or if they are non-haemorrhagic.¹² Wounds should be allowed to dry appropriately. Tetanus prophylaxis is indicated as appropriate.²² Prophylactic antibiotics are not recommended and should only be provided if there is empiric evidence of skin or soft-tissue infection. Bulky non-adherent dressings should be applied to affected areas post-management. Occlusive dressings should be avoided. Weight bearing on affected feet should be avoided. Affected limbs should be elevated to decrease inflammation and may require splinting or physiotherapy to prevent contracture formation and improve the range of motion.

Inflammation/anti-thromboxane management

The rationale for using non-steroidal anti-inflammatory drugs (NSAIDs) and aloe vera stems from early studies analysing frostbite blister fluid.²⁵ Thromboxane, a vasoconstricting metabolite of the arachidonic acid pathway, was found to be markedly elevated in clear frostbite blisters. A frostbite protocol was then established that used known inhibitors of thromboxane, NSAIDs and aloe vera, demonstrated by Hegggers *et al.* to decrease amputation rates.^{10,24,25} With no contraindications, ibuprofen can be given at 12 mg/kg/day²⁵ or aspirin at 325 mg PO daily.

Thrombolytic therapy

Thrombolytic therapy has extensive case series evidence suggesting a decrease in amputation rate in advanced frostbite if provided within the first 24 h.²⁶ Thrombolytic therapy is indicated if a patient presents within 24 h of initial insult and with severe frostbite presenting with high-risk morbidity.^{14,22,27} This can range from risk for limb amputation to frostbite in digits extending into proximal interphalangeal joints. Many protocols recommend either treating clinically advanced frostbite (grade 3–4) or if there is evidence of decreased perfusion based on angiography or a technetium/bone scan.^{28,29} While typically thrombolytic therapy should only be provided in a hospital setting, it has been given in austere environments.¹³ Thrombolytic therapy is contraindicated if time since rewarming is >24 h, or in trauma patients. Amputation rate increases with each hour that passes (warm ischemia) after rewarming before thrombolytic agents are administered, and thus timely treatment is critical.²⁹ tPA is generally administered with subcutaneous enoxaparin or heparin.^{27,29} A review suggested that there is no real advantage to intra-arterial administration versus intravenous.²⁶ If angiography or technetium scanning is available, imaging can be performed before and after starting thrombolytic therapy. tPA and heparin can also be provided intra-arterial with interventional radiology as resources allow.³⁰

Iloprost

Iloprost is a prostacyclin analogue that acts as a vasodilator, inhibits platelet aggregation, and may also have profibrinolytic and cytoprotective properties. It is indicated for severe frostbite of Grade 2–4, within 72 h of initial insult.^{10,22,31–33} While often used as the primary treatment, protocols have used it in cases non-responsive to thrombolysis or when thrombolysis is contraindicated.²⁸ Iloprost therapy does not require an available intensive care setting, but rather simply close monitoring of vital signs.¹⁰

Iloprost, while commonly used in Europe, is only available in Canada through Health Canada's special access program. Since its first published Canadian use in 2015, a growing number of centres across the country have gained access to it.³⁴ While

working in coordination with a hospital pharmacist, arranging the availability of iloprost has not proven to be an arduous endeavour for most rural hospitals in Canada. As a special-access drug, it is currently available cost free. Given its shelf life of up to 2 years, stocking a vial (one dose) or two in rural centres, and the rest in a regional centre, is reasonable. This allows for the treatment to be started as soon as possible even in more remote locals.

Two Canadian case series have demonstrated a decrease in amputation rate using iloprost as part of a comprehensive treatment protocol.^{33,35} Poole *et al.* demonstrated an amputation rate for both grades 2 and 3 to be 0% while grade 4 was 50%.³⁵ Crooks *et al.* compared 26 patients treated with iloprost to 64 treated without iloprost over a similar period. Grade 3 patients in the iloprost group had a 18% amputation rate versus 44% in the untreated group and Grade 4 demonstrated an amputation rate in the iloprost group of 46% versus 95% in the untreated group.³⁵

Continued care

The use of thrombolytic therapy and iloprost has led to promising tissue salvage. Frostbite centres can guide the acute management of frostbite in remote centres, especially if timelines for transfer may be delayed for thrombolytic or iloprost therapy. Ultimately, patients with severe frostbite require a consultation to a tertiary care or an experienced frostbite centre. This may initially be virtual. Damaged tissue may require surgical management for repeated debridement, escharotomy, fasciotomy or amputation.³⁶

Sequelae

Patients who have suffered frostbite may suffer from long-term effects. In particular, cold insensitivity is common, but variable. Case reports demonstrate vasomotor disturbances, neuropathic/nociceptive pain and arthritis. There remains uncertainty as to the pathophysiology of these changes.³⁷ Early work using Botulinum toxin type A does show some promise in allowing a return to working in cold environments by mitigating cold intolerance.³⁸

A RECOMMENDED TREATMENT APPROACH

In summary, we recommend the following treatment

approach in the algorithms below [Figures 4 and 5]. If frostbite injury is suspected, then rapid rewarming is indicated. Post-rewarming, the injury should be graded using the Cauchy grading system. If the injury is Grade 1, there is no further treatment required and the patient may be discharged with advice to avoid refreezing. If the injury is Grade 2 or higher, we recommend Ibuprofen or acetylsalicylic acid (ASA) as well as topical aloe vera as an antithromboxane treatment, as shown in Table 1 for dosing. If the injury is within 72 h of rewarming and Iloprost is available, it can be given as an intravenous infusion to all Grade 2–4 injuries, [Figure 4]. If a Grade 4 injury is within 24 h of rewarming, thrombolysis through tPA may be added. If there is access to only thrombolysis and not Iloprost, we suggest using thrombolysis in grade 3 and 4 frostbite, [Figure 5]. Unlike Iloprost, it is the authors' opinion that the complication risks of thrombolysis outweigh its use in Grade 2 injuries.

The algorithms provided are an approach based on the evidence at the hand. It is acknowledged that the evidence is based on case series and requires further investigation. However, given that there are no real alternatives, many areas are proceeding with treatment *in lieu of* waiting for more definitive evidence. The algorithms are based on the Yukon protocol,³⁹ but differ in that Figure 5 provides guidance for those centres which do not have access to iloprost. The main decision points

Table 1: Pharmacologic dosing in frostbite

Medication	Dose
ASA	325 mg q6h PO
Ibuprofen	400 mg q6h PO
tPA (Alteplase)	0.15 mg/kg IV bolus over 15 min, followed by a continuous infusion of 0.15 mg/kg/h IV for 6 h Maximum dose of tPA is 100 mg/day
Enoxaparin	1 mg/kg SC BID for 12 days If LMWH is contraindicated, use IV heparin 500–1000 U/h can be given for 6 h, while maintaining PTT at 2x baseline value
Iloprost	0.5 ng/kg/min IV 6 h/day for 5 days at maximum tolerable rate q30 min increase of 0.5 ng/kg/min to a maximum dose of 2 ng/kg/min Decrease rate by 0.5 ng/kg/min if the patient develops headache or hypotension

IV: Intravenous, tPA: Tissue plasminogen activator, SC BID: Subcutaneous twice a day, LMWH: Low molecular weight heparin, ASA: Acetylsalicylic acid, PO: By mouth, PTT: Partial thromboplastin time

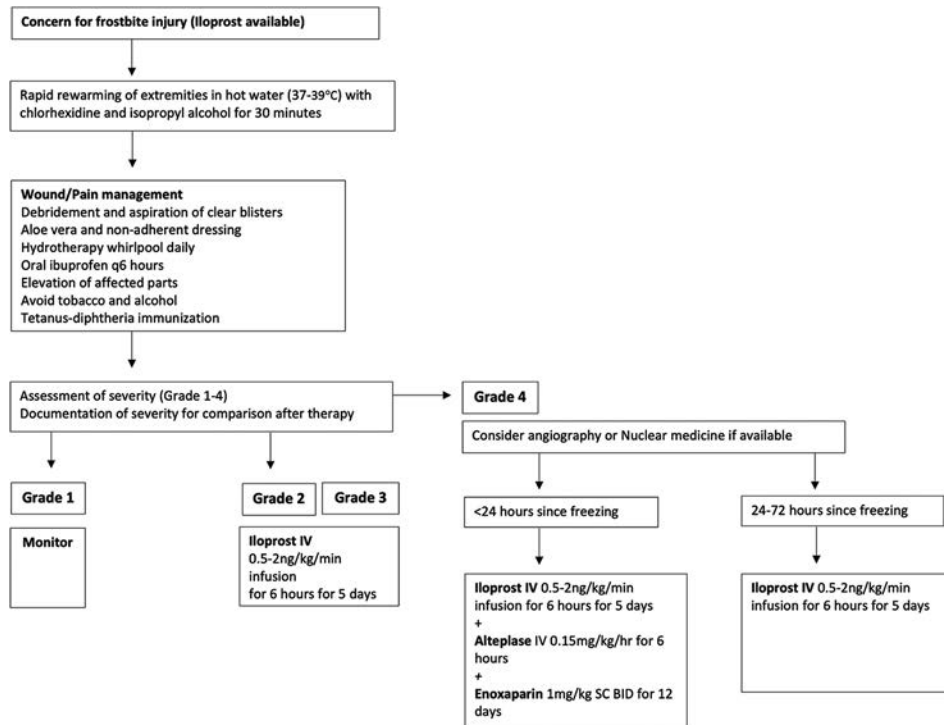


Figure 4: Frostbite treatment algorithm if Iloprost available.

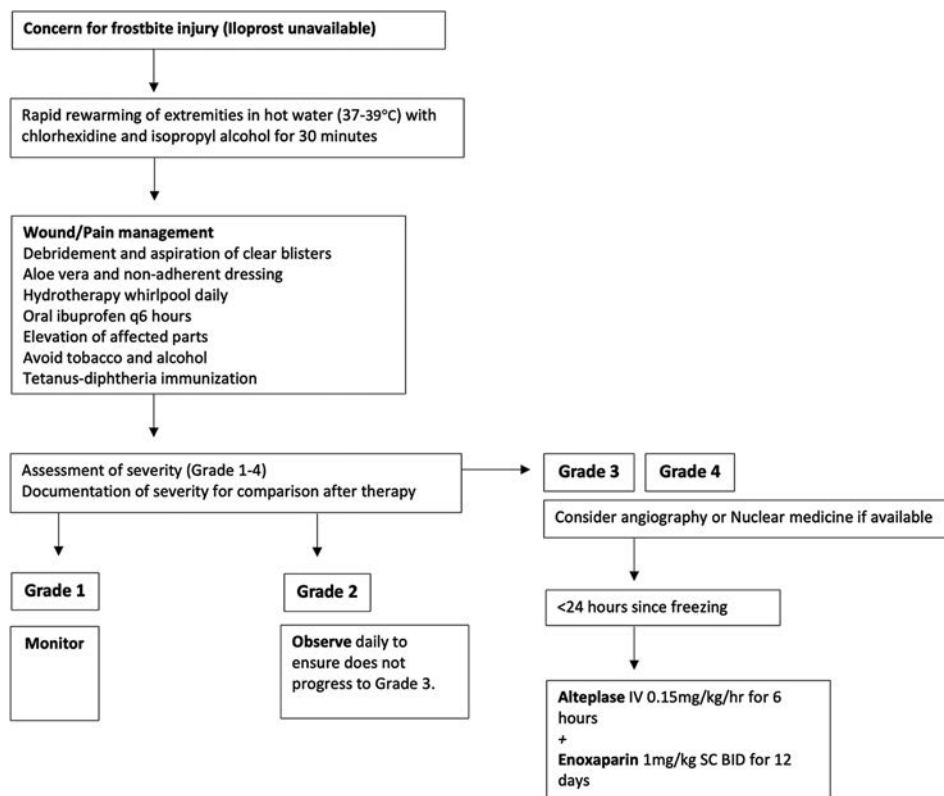


Figure 5: Frostbite treatment algorithm if Iloprost not available.

are classifying the injury as a Grades 2, 3 or 4 frostbite. If one has access to Iloprost, we suggest

treating Grades 2–4 with Iloprost and only add thrombolysis in Grade 4, [Figure 4].

CONCLUSION

All Canadian rural centres will occasionally encounter frostbite. Clinicians should prioritise tissue rewarming, grading the injury to establish the prognosis and recognise that time matters for advanced cases. While based on case series evidence alone iloprost ± thrombolysis should be considered in severe cases, given the lack of therapeutic alternatives.

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Conflicts of interest: There are no conflicts of interest.

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Rural doctors' clinical courage and COVID-19 pandemic

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Dear Editor,
The published study on rural doctors' clinical courage during the COVID-19 pandemic provides valuable insights into the consistent experience of clinical courage amongst rural doctors globally.¹ The researchers used qualitative interviews to gather comprehensive data from a diverse group of doctors from different countries, highlighting the challenges they face. However, the report lacks a detailed discussion on its limitations, such as the small sample size of only 13 interviews, which may not accurately represent all rural doctors worldwide. Conducting additional interviews would be crucial to capture a more representative sample of rural doctors internationally. According to the quantitative sample size calculation technique,² the study's sample size of 13 may represent <5000 rural doctors, despite an estimated 100,000 rural doctors worldwide. Given that the current study¹ is based on qualitative techniques, it could be based on the fulfilment of interview responses.³ However, it appears that there are still inhomogeneous responses, as several ways that responders gave to the queries are still detected, implying that a larger sample size is required to finalise. Expanding the number of

interviews is necessary to enhance the study's validity. The report could have provided more in-depth information on the specific attributes and characteristics of clinical courage identified in the interviews. Furthermore, it would be interesting to conduct a comparative analysis of clinical courage amongst rural doctors in different settings, such as developed and developing countries. Such an analysis could shed light on the unique challenges faced by rural doctors in resource-constrained environments and help develop strategies to better support and empower them. Overall, the study offers valuable insights into the experiences of rural doctors during the pandemic, but further research is needed to address its limitations and explore different contexts of clinical courage in rural healthcare.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

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RESPONSE

Dear Editor,

Our qualitative study¹ is part of a programme of research that is building a body of evidence about clinical courage. We used purposive sampling seeking 'information-rich' cases rather than a sample representative of doctors worldwide. Meaning-making in qualitative research relies on the richness of interview data rather than the number of participants. Using quantitative sample size estimations is inappropriate for qualitative studies.

The letter suggests that the sample was inadequate because of 'inhomogeneous responses'. We maintain the importance of describing diverse experiences and views. Although the concept of data saturation appears in some checklists for reporting,² this concept is contested and is neither well defined nor explained.³ Braun and Clarke suggest that saturation is inconsistent with reflexive thematic analysis and is often used as a rhetorical device rather than a considered methodological practice: 'a quality assurance mechanism to get passed by the gatekeepers of knowledge (reviewers)'.³ Qualitative methodologies vary considerably, and many factors will influence sample size.⁴ We considered the high specificity of our sample, the strength of the interview data and how well the data addressed the research question. As described by Malterud

et al., these factors underpin the 'information power' and appropriateness of the sample size.⁵ We therefore argue that the sample size enabled us to reach valid conclusions.

Finally, the letter suggests comparing doctors in developed and developing countries to explore different contexts. We included doctors from both groups to capture this diversity, but our focus was on the common aspects of rural doctors' experiences and the attributes of clinical courage. We agree that clinical courage offers a wealth of opportunity for further research but respectfully suggest that qualitative studies are not an ideal research design for comparative studies.

D. Campbell, S. Williams, J. Konkin, I. White, I. Couper, R. Stewart, L. Walters.

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A call to enhance rural medical education

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When I was an applicant to medical school, I familiarised myself with the concept of social accountability.¹ To me, social accountability reflects my desire to practise in a manner that reflects the needs of the region and community I hope to serve. Being a proud, homegrown student of the Northern Ontario School of Medicine University (NOSMU), I come into medicine with the steadfast belief that it is the communities of Northern Ontario to which I owe this service.

Currently, in Northern Ontario, as in other regions of Canada, there is a doctor shortage. More specifically, there is a doctor shortage in the rural communities where I hope to one-day practice. I know this, because of research on physician recruitment needs across the North. In June of 2022, there was an active recruitment of over 350 physicians. Of this number, over 200 were family physicians, including 110 rural generalists.² I also know that the institution that was built to address this specific need, NOSMU, is falling quite short on meeting this demand. Of the 1011 medical trainees, both students and residents, who have

come through NOSMU as learners since the first residency cohort graduated in 2008, only 46% have chosen to stay in Northern Ontario to practise medicine.³

Amongst that number, there is also a disparity in the distribution of those physicians. Of the medical students and residents who trained at NOSMU and chose to stay in Northern Ontario, only 23% practise rurally. Put another way, just shy of 11% of those 1011 NOSMU trainees (students and residents) practise in a rural community in Northern Ontario – on average 6–8 physicians per year since 2008. For me, as a learner, this brings up a few questions that I think are pertinent to how I consider my future career. How can we hope to uphold a mandate of social accountability if we don't go to where the people we are mandated to serve live? How does NOSMU secure a strong physician workforce for the future when only half of our undergraduate trainees stay in Northern Ontario to practise medicine?

While I can have a sense of humour regarding the job prospects in rural medicine, I also have a number of worries about a medical career in Northern Ontario. As a student, I am scared for the future of family

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medicine and rural generalism. The prospect of working in an overwhelmed, understaffed, underfunded and burnt-out primary care system is not appealing. I worry about the impact that working rurally will have on my relationships, both familial and social. I also worry that I will be a future casualty of the fatigue that has beset other healthcare providers. I also do not feel that I am alone in this regard.

I know that NOSMU and other medical schools are not intentionally swaying students away from a career in rural medicine. There are opportunities to be exposed to rural medicine through a few dedicated placements; however, these can be soured by pre-conceived opinions, myths and stereotypes. Some of the most notable advice I have gotten from peers, upper-year students, preceptors and faculty include:

‘You’ll have no help in a rural practice. You’re on your own, and that’s too much to ask of a new grad’.

‘There’s nothing interesting to see in (x rural community). Just old people who have hypertension and diabetes’.

‘There’s no money in family medicine. Just paperwork, and more paperwork’.

And while these sentiments are not necessarily factual, one can’t help but feel that each ring true, even by the smallest degree.

It can be hard to keep one’s ‘eyes on the prize’ and remember the drivers who encouraged me to pursue a career in rural medicine. Being able to camp and canoe close to home are certainly honourable mentions, but I think meaningful consideration brings me back to the communities and people who I feel obliged to serve. I know that pursuing rural medicine will provide me with challenges and opportunities that will lead to a satisfying and consequential career as a physician. Careers in rural medicine can be vibrant and clinicians should be able to truly thrive! However, to be pursued, the role of the rural generalist physician has to be visible and understood.

Rural doctors need to become more involved in medical education. Even at NOSMU, few rural doctors are involved in day-to-day classroom medical education. While the logistics of travel and clinical responsibility can be prohibitive, it

is imperative that these challenges are overcome so that students can hear the positive voices of rural and remote clinicians. Why can’t we bring rural docs to the classroom remotely using the technology with which we have become so familiar? Students might interact with rural preceptors on placement but do not often get the rural perspective in small groups. Even at NOSMU, I have only ever had one small group facilitated by a rural doctor. I would be hard pressed to think of any lectures taught by a rural generalist.

I challenge the rural and remote physicians of Canada to do just this: get involved. Inform learners on placement and in the classroom the great things about your job and speak to us frankly about the challenges. Mentor us. Connect with us. Sponsor us to attend conferences like Society of Rural Physicians’ annual Rural and Remote conference so that we can learn with and from you. There are students like me who are interested in rural medicine and who wish to pursue a career like yours: But we need the support and encouragement to do so. We need to see and hear the rural perspective frequently so that we can bust the myths and misconceptions that divert students from careers in rural practice.

We know you need support too. Help us be part of the solution with you.

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Erratum: Rendezvous procedure, a simultaneous endoscopic retrograde cholangiopancreatography and laparoscopic cholecystectomy for choledocholithiasis, in a rural surgical program in Northwest Ontario

In the article titled “Rendezvous procedure, a simultaneous endoscopic retrograde cholangiopancreatography and laparoscopic cholecystectomy for choledocholithiasis, in a rural surgical program in Northwest Ontario”, published on pages 190-194, Issue 4, Volume 28 of Canadian Journal of Rural Medicine,¹ Table 2 has been published incorrectly. However, the legend for Table 2 is accurate. The correct Table 2 is provided below:

Table 2

Table 2: Rendezvous procedure outcomes (n=29)

Successful CBD cannulation, <i>n</i> (%)	27 (93)
Stone removal, <i>n</i> (%)	23/29 (79)
Total surgery time (min), mean±SD	136±49.6
Length of hospital stay (days), mean±SD	2.1±1.3
Post-operative pancreatitis, <i>n</i> (%)	1 (3)
Perforation/Bile leak, <i>n</i> (%)	1 (3)
Sepsis, <i>n</i> (%)	0
Total complications, <i>n</i> (%)	2 (7)
Transfers to tertiary care centre, <i>n</i> (%)	3 (10)

CBD: Common bile duct, SD: Standard deviation

Additionally, the last sentence of the second paragraph in the ‘Results section’ was inadvertently missed. The correct paragraph should read as follows:

“There were six failed stone removals; two patients were transferred to tertiary care centres and four were stented at SLMHC with successful stone removal at a subsequent local repeat ERCP. The third patient transferred required ongoing surgical and intensive care management for a bile leak secondary to a duodenal perforation.”

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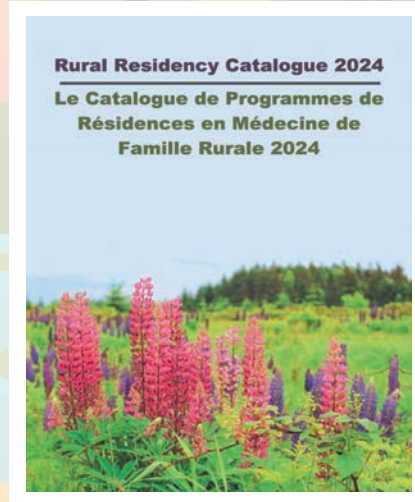
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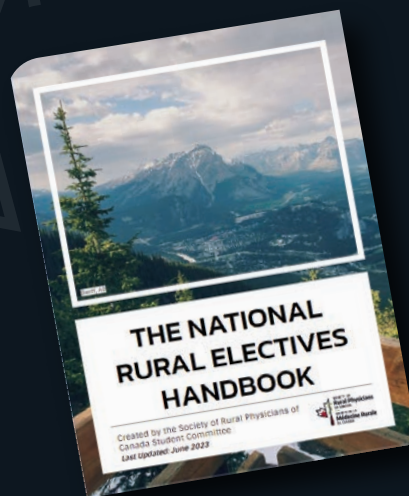
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- Have an interest in participating in post graduate education.

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Brockville General Hospital (BGH) is an accredited 160 bed community hospital, serving a regional population of 125,000. BGH offers an array of specialized acute, rehab, palliative and complex medical management care, with strong allied health support and ambulatory care services.

- Digital diagnostic services including CT and MRI.
- 10 bed, level III, closed Intensive Care Unit.
- A new (2020) rehabilitation and complex care building, which includes a 10-bed Palliative Care Unit and a cutting-edge Integrated Stroke Unit.
- 24-bed Schedule 1, Adult Mental Health Unit with Crisis Team support.
- Affiliation with Queen's University Family Medicine residency program.

Interested candidates may send their CV to:

Carlene MacDonald, Physician Recruiter
613 285 5057 mobile

BGHphysicianrecruitment@brockvillegeneralhospital.ca
Brockville General Hospital, 75 Charles St.,
Brockville, ON K6V1S8

4849a

Hospitalist Medicine Program

Smiths Falls Site

Full Time / Part Time Opportunities

The Perth- Smiths Falls District Hospital is a two site 85 bed, acute care community hospital serving a regional population of 66,000.

The community of Smiths Falls (pop. 9,000) is conveniently located midway between Kingston and Ottawa, along the Rideau Canal.

- ✓ *Return of Service eligible*
- ✓ *Student Loan Forgiveness program eligible*

Practice Profile

- Most Responsible Physician (MRP) for unattached adult patients
- Week long / 7 Day week (Saturday – Friday)
- 30 Medical/ Surgical beds (includes ALC) *plus 4 bed Level 2 ICU*
- Staffing = 2 Hospitalists daily (flexibility in patient assignment).
- 0800 - 1700 hrs in house coverage (one hospitalist must always be on site).
- 1700-2200 hrs available by telephone
- 2200 – 0800 hrs in house coverage by ED physician
- EMR (Medi Tech) / eScripton / PACs/ CT / MRI
- Full complement of specialty back up locally; Anesthesia / Internal Medicine/ General Surgery/ Ob/Gyn/ Ortho / Physiatry /Urology
- Established links with tertiary care centres 1 hour away (Kingston / Ottawa)

Remuneration

- Fee for Service + \$600 / day (weekday / weekend day)

Contact

Carlene MacDonald, Physician Recruiter, physicianrecruitment@psfdh.on.ca 613 285 5057 c

RADY FACULTY OF HEALTH SCIENCES

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To join Ongomiizwin – Health Services (formerly J.A. Hildes Northern Medical Unit), contact:

Acey (Adrienne) Spence – Recruitment Specialist
Ongomiizwin – Indigenous Institute of Health and Healing
Rady Faculty of Health Sciences, University of Manitoba
Tel: (204)789-3282 | Ongomiizwin.Recruitment@umanitoba.ca



LOCUM OPPORTUNITIES



ABOUT WAHA

The Weeneebayko (“Two Bays” – James Bay and Hudson’s Bay) Area Health Authority (WAHA) provides medical services to 6 communities on the shore of James and Hudson’s Bay; Moose Factory, Moosonee, Fort Albany, Kashechewan, Attawapiskat and Peawanuck. The population of the West Coast of James Bay is approximately 12,000 people; Primarily First Nations. The hospital is located in Moose Factory.

FIND YOUR EXTRAORDINARY AT WAHA



Weeneebayko Area Health Authority
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COVERAGE AND COMPENSATION DETAILS

Effective July 1, 2023 - September 30, 2023

Emergency Department Coverage

- 12 hour ED shifts (day or night) changing at 8AM or 8PM
- \$3000 daily stipend
- Travel time reimbursement of \$971 each way

Hospitalist Coverage

- Inpatient coverage from 8AM – 8PM daily
- \$2100 daily stipend
- Travel time reimbursement of \$971 each way

Primary Care Coverage

- Weekday family medicine clinics from 9AM – 5PM
- \$1100 daily stipend
- Travel time reimbursement of \$971 each way

Travel and accommodation expenses for all locum opportunities are covered by WAHA.

If you have the availability to assist, please contact:

Dr. Elaine Innes

Chief of Staff

Weeneebayko Area Health Authority

Mobile: 705-288-9271

Email: Elaine.Innes@waha.ca

Jaime Kapashesit

Physician Services Coordinator

Weeneebayko Area Health Authority

Phone: 705-658-4544 ext. 2237

Email: Jaime.Kapashesit@waha.ca



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