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info@srpc.ca

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Rural resiliency

Peter Hutten-Czapowski,
MD¹

Scientific Editor CJRM

Correspondence to:
Peter Hutten-Czapowski,
phc@srpc.ca

Rural communities have the deep resiliency needed to meet the challenges of any disaster, a resiliency that is grounded in a sense of community. There is a visceral understanding that we, the community, have the aegis to deal with the challenge, if for no other reason than lived experience, which teaches us that outside forces cannot or will not help or should not be depended on.

It's not easy. Our resources are finite, and the depth of our ability to draw on the community is variable, both within and between communities. The challenge can become existential and even ultimately overwhelming (e.g., the many communities where the major employer closes and the town ghosts). Be that said, a pandemic, that can be handled in true rural fashion.

In the early days of the pandemic when our clinic was short of personal protective equipment we had local seamstresses make us gowns and patient masks. We launder those gowns downstairs in the dentist's office. Our community nurses have cross-trained to be able to be seconded as needed to fill emergency and intensive care unit roles at the local hospital.

Primary care personnel have provided days of phone calls to the identified vulnerable and booked them with public health. In turn, the vaccine clinics have been staffed by

a mixture of health unit staff, local Emergency Medical Service (EMS) and a spectrum of nursing and other allied health. Our nurses have done house-calls, ferrying syringes of Moderna from the vaccine clinic to shut ins. The results have been gratifying. For ages 80 + district wide, we have 93.7% shots in arms. Pride in such outcomes is one of the reinforcing mechanisms that build rural resiliency.

Innately, we know that some communities do this type of work better than others. It's not entirely clear what makes one rural community more resilient than another. Some of it has to do with the innate nature of the town. One suspects that the mining town with company bungalows smelling of fresh paint may not do as well as the agrarian village with limestone homesteads steeped in history.

Some of it is leadership. A lot is relationships and trust. Certainly, in health care, resiliency comes from not only the individuals (always important) but also the ethos of the structures they work and live in. There are some communities that have no trouble recruiting and have low turnover. Others, we know too well, are a revolving door.

Defining what measures can be learned or worked on to build community resilience is a profoundly important set of questions that need answering.

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La résilience rurale

Peter Hutten-Czapowski,
MD¹

Rédacteur Scientifique,
JC MR

Correspondance:
Peter Hutten-Czapowski,
phc@srpc.ca

Les communautés rurales ont la résilience profonde pour composer avec n'importe quelle tragédie, une résilience ancrée dans la solidarité communautaire. Nous comprenons intuitivement que nous, la communauté, avons l'égide pour faire face au défi, si ce n'est que pour l'expérience vécue, laquelle nous enseigne qu'il ne faut pas compter sur les forces extérieures, et que celles-ci ne nous viendront pas en aide.

Ce n'est pas facile. Nos ressources sont limitées, et nos capacités à dépendre de la communauté sont plus ou moins profondes, tant à l'intérieur de la communauté qu'entre elles. Le défi peut devenir existentiel, voire écrasant (p. ex. beaucoup de communautés où le principal employeur ferme ses portes deviennent des villes fantômes). Cela dit, une pandémie que les plus pures méthodes rurales peuvent gérer!

Au début de la pandémie, durant la pénurie d'ÉPI à notre clinique, les couturières locales nous fabriquaient des blouses et des masques pour les patients. Nous lavions ces blouses à l'étage inférieur, au bureau du dentiste. Nos infirmières communautaires ont reçu une formation croisée pour pouvoir remplacer au besoin le personnel de l'urgence et des soins intensifs à l'hôpital local.

Le personnel de première ligne a passé des jours au téléphone pour prendre rendez-vous pour les personnes vulnérables en santé publique. Et les cliniques de vaccination opèrent avec un mélange

d'employés des unités de santé, d'ambulanciers locaux et d'une gamme de personnel infirmier et paramédical. Nos infirmières ont fait des visites à domicile, ont transporté des seringues de Moderna entre la clinique de vaccination et les personnes confinées. Les résultats sont gratifiants. Dans la population des 80 ans et plus de notre district, 93,7 % sont vaccinés. La fierté à l'égard de tels résultats est ce qui renforce la résilience rurale.

Intuitivement, nous savons que certaines communautés réussissent ce genre de travail mieux que d'autres. On ignore ce qui rend une communauté plus résiliente qu'une autre. Ça a un peu à voir avec la nature intrinsèque de la ville. On pourrait penser qu'une ville minière parsemée de bungalows de la compagnie qui sentent la peinture fraîche ne réussirait pas aussi bien que le village agricole parsemé de propriétés familiales en pierre baignant dans l'histoire.

Ça a aussi un peu à voir avec le leadership. Surtout les relations et la confiance. En santé, il est certain que la résilience découle non seulement des personnes (qui sont toujours importantes), mais aussi des valeurs des structures au sein desquelles elles travaillent et vivent. Certaines communautés n'ont aucun problème de recrutement et un faible taux de renouvellement. D'autres, on le sait trop, sont des portes tournantes.

De quelles mesures peut-on tirer des leçons et quelles sont celles qu'il faut peaufiner pour en arriver à la résilience communautaire, voilà une série de questions profondément importantes qui exigent des réponses.

Gabe Woollam, MD,
FCFP, FRRMS¹

¹President Society of Rural
Physicians of Canada,
Happy Valley Goose Bay,
NL, Canada

Correspondence to:
Gabe Woollam,
president@srpc.ca

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President's Message. Summer 2021 – A virtual success!

In April 2021, the Society of Rural Physicians of Canada (SRPC) held the 28th annual Rural and Remote Medicine Conference virtually. After having to cancel the 2020 event, we were worried that the alternative platform would not allow the humanity of rural generalism to shine through – the social connections and collegiality are what draw so many of us to the conference every year.

I was pleasantly surprised by how much of this transcended the screen. Between lively presentations, members sought personal interactions in the chats, passed each other in the networking corridor and engaged on Twitter. All of this reminded me of how important the conference is for our collective stamina and resilience.

We learned about many ongoing threats to rural health care in Canada. We heard about the encroachment of what Dr. Ruth Stewart called 'partialism' with the rise of sub-specialisation, difficulties in educating future generalists, broken rural patient transport systems, inequities in health and health access for indigenous people and the very real impacts of climate change.

But, we also learned about how Australia has worked to strengthen rural generalism and how Canada is becoming a leader in rural medical education. We learned about the advocacy efforts of the Rural Road Map Implementation Committee. With their recently released

Call to Action: An Approach to Patient Transfers for Those Living in Rural and Remote Communities in Canada,¹ RRMIC has given all of us a key tool to lobby for change in our respective corners of the country. Similarly, the *Rural Road Map: Report Card on Access to Health Care in Rural Canada*² challenges each of us to consider where we still have room to grow.

As an organisation, the SRPC is working hard to figure out which levers we can pull to stave off the persistent threats to rural health care and to shape systems to help communities grow. To overcome one of the most challenging experiences in our lifetimes, we must work collectively to protect and guarantee equitable access to high quality generalist and specialist services in rural and remote communities across Canada. To do so, will require our clinical courage, cultural expertise and compassion, both virtually and in person.

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Message du président. Virtuellement un succès!

Gabe Woollam, MD,
FCFP, FRRMS¹

¹President Society of Rural
Physicians of Canada,
Happy Valley Goose Bay,
NL, Canada

Correspondance:
Gabe Woollam,
president@srpc.ca

En avril 2021, la SMRC a tenu en mode virtuel son 28^e sommet annuel sur la médecine en régions rurales et éloignées. Après avoir dû annuler le sommet de 2020, la plateforme virtuelle allait peut-être empêcher l'humanité du généralisme rural de briller, et cela nous inquiétait – les rapports sociaux et la camaraderie sont, après tout, ce qui attire bon nombre d'entre nous au sommet chaque année.

La façon dont cela s'est transcendé à l'écran m'a beaucoup surpris. Entre les présentations dynamiques, les membres ont interagi sur le plan personnel dans les clavardages, se sont croisés dans les corridors du réseautage et ont engagé la conversation sur Twitter. Tout ça m'a rappelé l'importance de la conférence pour notre endurance et notre résilience collective.

Nous avons découvert les nombreuses menaces à la médecine rurale au Canada. Nous avons écouté la D^{re} Ruth Steward nous parler de l'empiétement de ce qu'elle a appelé le "partialisme" à l'avènement des surspécialisations, des difficultés de former les futurs généralistes, des systèmes dysfonctionnels de transport de patients en région rurale, des iniquités en santé et à l'accès en santé pour les Autochtones, et de l'impact très réel du changement climatique.

Mais nous avons aussi découvert comment l'Australie a renforcé son généralisme rural et comment le Canada s'élève au rang de leader de la formation en médecine rurale. Nous avons écouté les efforts de sensibilisation déployés par le comité de mise en œuvre du Plan d'action pour la médecine rurale. Avec

sa plus récente publication *Call to Action: An Approach to Patient Transfers for Those Living in Rural and Remote Communities in Canada*, (1) le comité nous donne un outil d'importance pour faire pression vers le changement dans notre coin de pays respectif. Aussi, le *Rural Road Map: Report Card on Access to Health Care in Rural Canada* (2) met chacun de nous au défi de réfléchir aux domaines où le progrès est encore possible.

À titre d'organisation, la SMRC est à pied d'œuvre pour déterminer quels leviers elle peut activer pour éliminer les menaces persistantes à la médecine rurale et pour façonner notre système de manière à aider les communautés à grandir. Pour surmonter l'un des plus grands défis de notre vie, nous devons nous unir pour protéger et garantir l'accès équitable aux généralistes et aux services spécialisés de grande qualité dans les communautés rurales et éloignées du Canada. Pour ce faire, nous allons devoir faire preuve de courage clinique, d'expertise culturelle et de compassion, tant en mode virtuel qu'en personne.

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Assessing a research training programme for rural physicians

Cameron MacLellan,
BMus, MSc¹,
Cheri Bethune, MD,
MCLSc, FCFP²,
Thomas Heeley,
MASP^{1,2},
Wendy Graham, MD,
FCFP²,
Catbryn Button, MSc,
PhD³,
Shabnam Asghari,
MD, MPH, PhD^{1,2,4}

¹Centre for Rural Health
Studies, M5M105, Medical
Education Building, Health
Sciences Centre, ²Department
of Family Medicine, Faculty
of Medicine, Memorial
University of Newfoundland,
Health Sciences Centre,
³Department of Psychology,
Memorial University of
Newfoundland, ⁴Primary
Healthcare Research Unit,
Agnes Cowan Hostel, Health
Sciences Centre, St. John's,
Newfoundland, Canada

Correspondence to:
Shabnam Asghari,
shabnam.asghari
@med.mun.ca

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Abstract

Introduction: To assess the effect of a training programme called 6for6 (the programme) on research competency and productivity amongst rural physicians. The programme develops the research skills of six rural physicians over six weekends. Physicians learn about various research methods and writing techniques through blended learning components.

Methods: We conducted a quasi-experimental study, comparing research competency and productivity between intervention and non-equivalent control groups and over time through a repeated measures design. Generalized linear mixed model (GLMM), ANOVA, and Cochran Q tests were conducted. The intervention was provided to five groups of 6 rural physicians each between 2014 and 2019. Main outcome measures: self-assessed research competency (knowledge, attitudes and skills) and productivity (publications, grants and presentations of research-related work at conferences) were our primary and secondary outcomes, respectively. We measured the outcomes before, during and after the programme. Controls: Rural physicians who expressed interest in the programme and later enrolled.

Results: This study shows that, amongst its thirty participants, overall research competency was significantly different between intervention and control groups ($65.7\% \pm 37.6\%$ and $58.6\% \pm 14.4\%$, $P < 0.05$ for GLMM). The percentage of participants who were productive before, during and after the programme was 26.7%, 16.7% and 50.0%, respectively. Overall, productivity rates were significantly different between intervention and control groups (rate difference was 72.2/100 person-years, $P < 0.05$ for GLMM).

Conclusion: This study suggests that the programme improves research competency and productivity for rural physicians. Rural physicians who wish to improve their research competency would benefit from participating in similar programmes.

Keywords: Research skills, research training programme, rural communities, rural health

Résumé

Introduction: Évaluer l'effet d'un programme de formation intitulé 6for6 (le programme) sur les compétences en recherche et la productivité parmi les médecins des régions rurales. Le programme permet à six médecins en région rurale d'acquérir des compétences en recherche durant six fins de semaine. Les médecins

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apprennent diverses méthodologies de recherche et techniques de rédaction par l'entremise d'un programme d'apprentissage mixte.

Méthodologie: Nous avons réalisé une étude quasi-expérimentale, qui comparait les compétences en recherche et la productivité entre des groupes non-équivalents intervention et témoin, et dans le temps, par une méthodologie à mesures répétitives. Un modèle linéaire à effets mixtes généralisé (GLMM), un modèle d'analyse de variance, et des tests Q de Cochran ont été réalisés. L'intervention a été appliquée à 5 groupes de 6 médecins en région rurale, entre 2014 et 2019 dans tous les cas. Paramètre d'évaluation: compétences en recherche évaluées par l'apprenant (connaissances, attitudes et compétences) et productivité (publications, subventions et présentation des travaux de recherche aux congrès) étaient respectivement nos paramètres d'évaluation principal et secondaire. Nous avons mesuré les paramètres avant, durant et après le programme. Les médecins en région rurale ayant manifesté de l'intérêt à l'égard du programme ont été inscrits.

Résultats: L'étude montre que parmi les 30 participants, les compétences générales en recherche étaient significativement différentes entre les groupes intervention et témoin ($65,7 \pm 37,6\%$ et $58,6 \pm 14,4\%$, $P < 0,05$ pour le GLMM). Le pourcentage de participants qui étaient productifs avant, durant et après le programme était respectivement de 26,7, 16,7 et 50,0%. Dans l'ensemble, la productivité était significativement différente entre les groupes intervention et témoin (différence des taux: 72,2 par 100 années-personnes, $P < 0,05$ pour le GLMM).

Conclusion: Cette étude laisse penser que le programme améliore les compétences en recherche et la productivité chez les médecins en région rurale. Les médecins en région rurale qui souhaitent améliorer leurs compétences en recherche bénéficieront de programmes semblables.

Mots-clés: Compétences en recherche, programme de formation en recherche, santé en région rurale, communautés rurales

INTRODUCTION

For most rural physicians, engaging in scholarship is challenging. As described in the CanMEDs framework, those who wish to participate in research must pursue 'advanced research training'.¹ While research training is provided during undergraduate medical education and residency training, studies suggest that it receives limited curricular time.^{2,3} Furthermore, advanced research training programmes are not accessible for rural physicians once in practice due to geographical and professional isolation and a lack of time and funding.⁴⁻⁹

Rural physicians are often interested in exploring questions related to their clinical practice^{8,9} and bring an important contextual understanding of rural communities to bear on health-care research.^{2,10-13} Given the geographical diversity between rural communities and a gap in rural health-care research, rural physicians have potential to develop research that yields locally feasible solutions.¹⁰

Although research training programmes do improve research activities amongst health-care professionals,^{14,15} our literature search found that a limited number of programmes are available to support rural physicians' research endeavours in a

variety of settings. The clinician-scholar support team in Japan provides online research support for rural physicians,¹⁶ while a few programmes in Australia provide research support either in urban or rural settings.¹⁷⁻²⁰ Furthermore, these programmes provide limited support for rural physicians' research activities,^{16,17} and only certain authors have published assessments of programme outcomes such as research competency and productivity.¹⁸⁻²⁰ In research, competency is a subjective measure of the relationship between knowledge, attitudes and skills of an individual that combine to produce results.²¹ Research productivity often takes the form of publications, grants or presentations of research-related work at conferences and is regarded as an objective measure of research competency.²²

To empower rural physicians to pursue their research interests, Memorial University of Newfoundland developed a research training programme called 6for6 (the programme).^{23,24} This 1-year programme focused on developing the research capabilities of 6 rural physicians, taking place through face-to-face sessions over 6 weekends (Friday and Saturday only). The purpose of this study is to assess the effectiveness of the programme in building research competency (knowledge, attitudes and

skills) and productivity (publications, grants and presentations of research-related work at conferences) amongst its participants.

METHODS

Study design

This quasi-experimental study occurred from April 2014 to October 2019 at Memorial University of Newfoundland, comparing research competency and productivity between intervention and non-equivalent control groups and through a repeated measures design.

Intervention

The intervention in this study is the programme, which assists rural physicians to develop research capabilities. Through a blended learning curriculum, participants learn research methods and writing techniques, develop their own research projects with a mentor and cultivate a research network with other rural physicians. They are also supported by the programme coordinator.²⁴ We delivered the programme to 5 different groups of 6 rural physicians each year from 2014 to 2019 inclusive.

Study population and inclusion criteria

Rural physicians practising in Newfoundland and Labrador, Nunavut and New Brunswick were eligible to apply. Candidates applied by submitting a letter of interest detailing a research idea related to their local practice, along with a resume and answers to eligibility screening questions. Participants were required to have at least 1 year of experience practising in a rural area. No previous research training was necessary. Participants with full-time faculty affiliations at any university were excluded from this study.

Outcome measures

The primary outcome is research competency, defined as participants' knowledge, attitudes and skills. Knowledge refers to participants' understanding of research concepts and their ability to recall the information. Attitudes represent the extent to which one views research as valuable

and worthwhile. Participants' research skills refer to their ability to put research knowledge into practice.²¹

The secondary outcome, research productivity, refers to participants' publications, grants and presentations of research-related work at conferences. Any articles successfully published in a peer-reviewed journal or successful applications for research funding count as publications and grants, respectively. Presentations of research-related work at conferences refer to workshops or presentations (poster, oral or keynote) at local, national or international research symposia.²²

Non-equivalent control groups

The control groups were recruited from the pool of rural physicians who expressed interest in the programme and later enrolled. By the time of first contact with participants, they had not received any prior research training. For every individual who received the intervention, we used up to four controls. All participants reported baseline values before programme entry, which allowed us to compare the intervention group of 1 year with control groups represented by those enrolled in different years. For example, individuals who received the intervention in year 5 were compared to the controls in years 1–4, while those in year 4 were compared to the controls in years 1–3 and 5.

Data collection

Each year we measured participants' self-assessed research competency and productivity at zero months, during the programme and at 12 months using the same survey. The pre-programme survey was collected at zero months, the interim survey was collected during the programme, and the post-programme survey at 12 months. To measure research competency during the programme, we divided the competency survey into six sections and delivered them 1 week after each session; each section corresponded with the curricular topics of each session. We combined these survey sections to create the interim-programme survey.

Data collected before the programme represented physicians' research competency at

baseline and thus established the control group, while data collected at 12 months represented the intervention group.

The generalised linear mixed model (GLMM) allowed us to compare the intervention group of 1 year to the control groups of all other years until each year had a chance to represent the intervention group. This approach allowed us to control for the effects of time. Since each group of participants enrolled in the programme in different years, we did not collect data for the intervention and control groups simultaneously.

Using the research productivity questionnaire, we collected data about participants' productivity before, during and after the programme. We conducted a respondent validation questionnaire in September 2019 to verify the accuracy and recency of this information. We used productivity data collected at the beginning and end of the programme (e.g., at zero and 12 months) to compare the control and intervention groups through a GLMM.

To improve response rates, we reminded participants three times to complete the surveys at 2-week intervals.

Data analysis

We performed descriptive analyses to assess response rates to the surveys and questionnaires and demographic characteristics of the participants.

To assess change in research competency over time, we used a two-way, repeated measures ANOVA where we compared the mean differences between scores in the pre-, interim- and post-programme surveys. We used GLMM to compare the post-programme survey scores of intervention groups with the pre-programme scores of control groups.

For research productivity, we conducted a repeated measures analysis using the Cochran Q test to determine changes over time (before, during and after the programme). To assess for differences in research productivity rates between intervention and control groups, we calculated the number of research products per 100 person-years and analysed the data using a GLMM.

We performed all analyses in R studio, with a $P < 0.05$ being considered significant. For both research competency and productivity, we

controlled for differences within and between groups using the GLMM. We accounted for differences related to time by including years of practice in the R commands. This study was approved by the Newfoundland and Labrador Health Research Ethics Authority.

RESULTS

During the 5-year study period, 30 rural physicians enrolled in the programme, and 19 (63.3%) were female. There were 27 (90.0%) physicians who practised in Newfoundland and Labrador and 3 (10.0%) from Nunavut. Approximately 83.3% ($n = 25$) were family physicians, while the remaining participants were from other specialities ($n = 5$, 16.7%). Research competency survey response rates were 100% for the pre-programme survey, 93.3% for the interim-programme survey, and 76.7% for the post-programme survey. When we ran the GLMM, the response rate for the control group was 100% and 76% for the intervention group. The response rate for the respondent validation questionnaire was 19 (63.3%). We included all participants in the analysis and assumed that non-respondents had no additional research activities since completing the research productivity questionnaire. No participants dropped out of the programme.

Effect of the programme on self-assessed research competency

The mean and standard deviation for the pre-, interim-, and post-programme questionnaire scores for overall competency were $58.6\% \pm 14.6\%$, $61.1\% \pm 24.4\%$ and $65.7\% \pm 37.6\%$ respectively; we observed no significant differences between these scores through the repeated measures analysis. A summary of these results can be found in Table 1, which also includes the results for research knowledge, attitudes and skills.

The results of the GLMM showed differences in mean competency scores between the intervention and control groups [Table 2], which revealed a significant increase between the pre- and post-programme scores in overall research competency (mean and standard deviation: $58.6\% \pm 14.4\%$ and $65.7\% \pm 37.6\%$, $P < 0.05$).

Table 1: Research competency scores of 6 for 6 participants who completed the pre , interim , and post programme surveys (n=30)

Competency	Survey scores (Mean ± SD)		
	Pre-programme	Interim	Post-programme
Overall	58.6% ± 14.6%	61.1% ± 24.4%	65.7% ± 37.6%
Knowledge	48.3% ± 14.9%	55.8% ± 26.4%	65.3% ± 37.5%
Attitudes	84.1% ± 19.0%	52.2% ± 34.6% [#]	71.7% ± 40.7% ⁺
Skills	48.3% ± 15.4%	50.6% ± 25.5%	62.4% ± 36.1%

⁺significantly different than pre-programme score, *P* value for repeated measures ANOVA<0.05
[#]significantly different than interim-programme score, *P* value for repeated measures ANOVA<0.05

Table 2: Research competency scores of 6 for 6 participants in intervention and control groups (n=30)

Competency	GLMM (mean±SD), %	
	Control	Intervention
Overall	58.6±14.4	65.7±37.6*
Knowledge	48.3±14.7	65.3±37.5**
Attitudes	84.1±18.7	71.7±40.7**
Skills	48.3±15.2	62.4±36.1**

*<0.05, **<0.0005, *P* value for GLMM. GLMM: Generalized linear mixed model, SD: Standard deviation

Effect of the programme on research productivity

Table 3 shows the repeated measures results for all components of productivity. The results of the Cochran Q test demonstrate that the proportion of participants who published articles after the programme was significantly higher than before and during the programme (*P* < 0.05).

Overall, the GLMM revealed a significant improvement in productivity rates between the control and intervention groups [Table 4]. The intervention group had significantly higher publication rates, rates of secured grants and presentations of research-related work at conferences.

The sensitivity analysis for the productivity and respondent validation questionnaires showed that all results were consistent with the original data set.

DISCUSSION

This study shows that the 6for6 programme increases rural physicians' research competency and productivity compared to the control groups. Our results are consistent with other studies.^{16,18} Although knowledge, skills, presentations of research-related work at conferences and grants increased by the end of the programme, the

repeated measures analysis demonstrated that these results were not significant. This could be due to the small sample size of the study. For an example, the rural research capacity building programme in Australia found significant increases in research experience scores and publication rates with high sample sizes.^{18,19}

The sensitivity analysis found that results for competency and productivity were consistent in all categories except for attitudes. This is consistent with previous studies, which suggest that building positive attitudes toward research takes time.^{25,26} Study participants could possibly benefit from spending 2 years in the programme instead of one.

The availability of external research support could be a factor in research productivity outcomes. In this study, alumni who worked in the Labrador-Grenfell Regional Health Authority were eligible to apply for grant funding through an extension programme.²⁷ We conducted a sensitivity analysis by excluding those who were eligible for these grants (*n* = 4). Although the effect size of the productivity rate decreased, the results remained significant. This suggests that similar interventions are effective; however, additional support from an external source seems to contribute to an increase in research productivity.

Limitations

Thisquasi-experimentalstudyusingnon-equivalent control groups should be interpreted in light of its limitations.

Some aspects of the programme's delivery limit our findings. While alumni who participated earlier during the study have had more time to produce research, those from later years may have benefitted from programme improvements. These improvements applied to the content delivered, session activities, daily schedule and personnel involved in the study. To control for these factors,

Table 3: Research productivity of 6 for 6 participants before, during, and after the 6 for 6 programme (n=30)

Productivity	Research productivity (%)		
	Before 6 for 6	During 6 for 6	After 6 for 6
Overall	26.7	16.7*	50.0 [†]
Publications	3.3*	6.7*	30.0 ^{‡,†}
Grants	6.6	16.7	26.7
Presentations of research-related work at conferences	16.7	6.7	26.7

*Significantly different than after 6 for 6, *P* value for Cochran Q-test <0.05, †Significantly different than before 6 for 6, *P* value for Cochran Q-test <0.05,

‡Significantly different than during 6 for 6, *P* value for Cochran Q-test <0.05

Table 4: Research productivity rates of 6for6 participants in intervention and control groups (n=30)

Productivity	Research production rate per 100 person-years	
	Control	Intervention
Overall	8.4±19.9	80.6±207.6 ^{*,#}
Publications	0.1±0.55	21.8±48.3 ^{**}
Grants	1.6±6.2	17.3±33.4 ^{**}
Presentations of research-related work at conferences	6.6±19.5	42.8±160.6 [*]

Rates are per 100 person-years. * < 0.05, ** < 0.0005, *P* value for GLMM. # One participant produced a large amount of research which contributed to a high standard deviation. The rate difference between intervention and control groups remained significant in all categories after excluding this participant

we used a GLMM with random effects to compare research competency and productivity between groups. We found no significant differences. To further address this limitation, the programme established a 'Come Home Year', where previous participants were invited for a weekend retreat to reconnect with mentors and peers to discuss new and existing research projects.

The number of survey items increased over time, potentially influencing survey performance of participants from the final 3 years of the study. We controlled for the effect of time and found no significant differences between groups with different survey lengths.

One participant produced a high amount of research in comparison to the rest of the groups. While the literature suggests that this phenomenon is common for research training programmes,¹⁸ there is potential that prolific research production from a single participant can skew the results. We conducted a sensitivity analysis by removing this participant and found no changes in the results.

Non-response bias is a limitation of this study due to incomplete surveys and questionnaires. To mediate this bias, we imputed data to test the consistency of the results with several scenarios (e.g., best- and worst-case scenarios). The details of the sensitivity analysis are available upon request.

Due to a small sample size and to ensure confidentiality, we could not control for variables such as gender/sex, speciality or years of practice. As a result, we were unable to match the intervention groups to the controls based on years of practice. Future research would also benefit from a larger sample size so that possible moderating influences such as sex, speciality and years of practice could be assessed.

The Hawthorne effect is another limitation, where participants were aware of their involvement in this research study and could potentially change their behaviour to affirm the hypothesis. There were several measurements during and after the study period; however, we did not see a shift in the findings over time.

Some tests may be significant due to multiple testing. We adjusted the *P* values in the repeated measures analysis and GLMM for research competency and productivity. All results remained significant except for overall research competency scores in the GLMM and the rate of presentations of research-related work at conferences per year.

Nonetheless, to fully assess the effect of experience with the passage of time, it is important to follow participants for a longer period of time. Statistical controls, while very useful, do not capture the myriad context effects that might occur in the multifaceted environment studied here.

Future research

Future research would benefit from a longer time frame to ensure participants have enough time to finish their research projects. This alternative option would allow participants to publish their work by the end of the study and enable researchers to use additional measures of productivity such as citation counts, first author publications or amount of grant money awarded. Future studies could compare the effectiveness of their research programmes to a virtual stream for rural physicians who prefer to learn from home. This could benefit participants who wish to reduce the amount of travel required to pursue research training.

CONCLUSIONS

Rural physicians lack the resources to develop as researchers. This study found that the 6for6 programme enhances research competency and productivity amongst rural physicians. Although overall research competency and productivity increased between the intervention and control groups, attitudes toward research remain inconclusive. This is the first programme in Canada that helps rural physicians conduct research in the communities they serve. Similar programmes could help rural physicians develop research projects relevant to their patients and practice.

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Evidence-based support for community outreach worker programme in Rural British Columbia, Canada

Izabela Szelest, PhD^{1,2},
Colleen Black, MD¹,
Susan M. Brown²,
BSCN, MHS,
Ella Monro, MD¹,
NP Tanya Ter Keurs,
BcN, MNP¹
Jenny Pedwell³,
Aarin Frigon¹

¹South Okanagan
Similkameen Division
of Family Practice,
197 Warren Avenue East,
²South Okanagan Primary
Care Interior Health
Authority, Kelowna, British
Columbia, Canada, ³OneSky
Community Resources,
Penticton BC V2A 4L7

Correspondence to:
Izabela Szelest,
izabela.szelest@interior-
health.ca

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reviewed.

Abstract

Introduction: Community outreach workers (CWs) provide critical services to their community by connecting marginalised people to community and primary care services. The importance of CWs is overlooked in the current provincial primary health-care transformation due to perceived lack of evidence. This evaluation describes the efficacy of the CW programme in a rural British Columbian community. **Methods:** Capacity of the programme was determined by reviewing service and financial reports. Outcomes of the programme were analyzed from the electronic medical records and health systems data. Group discussions were conducted with providers, care team members and CWs for a deeper understanding of programme efficacy and impact.

Results: For 64 h per month, CWs supported 15 clients, provided 28 visits and executed 10 referrals to community resources. The typical client was an adult of low socioeconomic status, unable to effectively organise themselves and navigate the health-care system and/or community resources, often as a result of undiagnosed low mental or cognitive functioning. The programme positively impacted the health-care system by facilitating 142 attachments to providers, reducing client emergency department use by 41%, while marginally increasing primary care services (6%), and supporting more appropriate emergency department visits.

Conclusion: Clients enrolled in the programme did not fit into already defined services offered by the health authority. However, they required support to effectively function in their community. With the current health-care system transformation in British Columbia, it is imperative that the CW programme is recognised for its value to attract and maintain stable funding.

Keywords: Community health workers, community outreach workers, team-based care

Résumé

Introduction: Les travailleurs communautaires assurent des services essentiels à leur communauté en rapprochant les personnes marginalisées et les services communautaires et médicaux de première ligne. La transformation actuelle des soins provinciaux de première ligne ne reconnaît pas l'importance des travailleurs

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communautaires en raison de l'absence perçue de données probantes. Cette évaluation décrit l'efficacité du programme de travailleurs communautaires dans une communauté rurale de la Colombie-Britannique.

Méthodologie: La capacité du programme a été déterminée par l'étude des services et des rapports financiers. Les résultats du programme ont été analysés à partir des dossiers médicaux électroniques (DME) et des données du système de santé. Des discussions en groupe ont eu lieu avec les fournisseurs de soins, les membres des équipes de soins et les travailleurs communautaires afin de mieux comprendre l'efficacité et l'impact du programme.

Résultats: Pendant 64 heures par mois, les travailleurs communautaires ont aidé 15 clients, effectué 28 visites et exécuté 10 recommandations à des ressources communautaires. Le client typique était un adulte à faible statut socio-économique, incapable de s'organiser efficacement et de naviguer dans le système de santé et/ou les ressources communautaires, souvent en raison d'un déficit mental ou cognitif non diagnostiqué. Le programme a eu un impact positif sur le système de santé en permettant 142 contacts avec des fournisseurs de soins, en réduisant de 41% les visites à l'urgence, tout en augmentant marginalement les services de soins de première ligne (6%), et en favorisant plus de visites appropriées à l'urgence.

Conclusion: Les clients inscrits au programme n'arrivaient pas à s'intégrer aux services préalablement définis offerts par les autorités de santé. Mais ils avaient quand même besoin d'aide pour fonctionner efficacement dans leur communauté. Avec la transformation actuelle du système de santé en Colombie-Britannique, il est impératif que le programme de travailleurs communautaires soit reconnu pour sa qualité réelle et qu'il reçoive et maintienne un financement stable.

Mots-clés: Travailleurs communautaires, travailleurs d'approche communautaire, soins en équipe

INTRODUCTION

According to the World Health Organisation, there is a growing need for community-based workers who deliver a range of preventive and promotive health services to improve client outcomes¹ and contribute to reducing inequalities in access to care and services.¹⁻⁵ According to Najafzada *et al.*, community health workers (CHW) are deployed to provide health and socioeconomic services to clients within their community, including guiding them through the healthcare system and other services.² There is much confusion in the literature and practice due to varying title names. For example, the literature identifies these positions as CHW or aboriginal health workers.² In the Interior Health Authority (IH), the CHW role resembles that of an aide worker, where CHWs assist with personal care, household duties and meal preparation.⁶ The closest similar position, as defined by literature, is the community mental health worker (CMHW). However, these services are directed only to clients with previously diagnosed or assessed mental health or cognitive conditions. Regardless of the terminology, these roles are heavily used in low-income countries, as they have been shown to be cost-effective⁷ as key positions linking clients with needed services.^{8,9} Recently, high-income countries such as Canada, US, UK and Australia have also been increasingly

using such roles in the primary care setting^{2,10} and the emergency department.¹¹

Community outreach workers (CWs) have been introduced as integral members of the primary care team in the patient-centered medical home (PMH), a care delivery model where care is coordinated through the primary care physician.^{2,10} Their role closely resembles that of the CMHW but is not guarded by the rules of client eligibility or any unionised bargaining unit. In the British Columbia primary care transformation, the PMH serves as a foundation of care delivery in the integrated system of primary and community care.¹² PMHs integrate into Primary Care Networks which serve as the backbone of the team-based approach that allows patients access to a full range of health-care options.^{13,14} Thus far, team members can include family providers, specialists, nurses, social workers and other allied care providers, such as therapists and pharmacists.^{13,14} Interestingly, CWs have not been recognised as potential members of the team in their funding models, despite literature suggesting that such roles have been recommended to take on the coordination of care functions for patients.^{10-12,15}

Princeton, British Columbia began its CW programme on 1st March, 2015 as a response to disparities for clients who were unable to navigate the health and social systems and programmes themselves. The purpose of the programme

is to enable primary care providers (general practitioners and nurse practitioners) to support their clients with psychosocial needs. Princeton CWs support two nurse practitioners and five family physicians. CWs connect clients with community services and programmes, such as day programmes, skills centres, lawyers, food bank, tax preparation, new mom supports, children's programmes and rehabilitation; these services support an ageing population that is expected to grow 39% by 2023, increasing the current rates of top chronic diseases, including mood and anxiety disorders (43%) and depression (39%).¹⁶ CWs advocate for clients with government agencies, including the Ministry of Health. As well, they help clients transition from home to facilities, assess needs and attend physician/client appointments, if necessary. Since the programme's inception, CWs have been integrated as part of the PMH team that supports team-based care.

The objectives of this evaluation were to depict one community's CW programme structure within the community context, determine the barriers and facilitators of a successful programme implementation and highlight potential return on investment. To achieve these objectives, a retrospective quantitative analysis of past CW reports, health authority data, annual financial reports, Electronic Medical Record (EMR) data and integrated team member surveys were conducted. As well, qualitative data were collected to obtain a deeper understanding of the efficacy of the programme.

METHODS

The Princeton PMH is located in the local health area (LHA) that extends over 4895 km² and is classified as a rural hub with a population of 4795 people.¹⁶ This LHA contains various community services with access to specialised care available at the Penticton Regional Hospital, 100 km away. Local services include a health centre with a medical clinic, general hospital, laboratory and X-ray outpatient services, home and public health, mental health and substance use, and assisted living. Available community resources include a child and youth mental health counsellor, crisis assistance society, foodbank, adult day programmes, home support, meals on

wheels, subsidized housing, family services and Red Cross equipment loan programme.

Our study was a mixed method retrospective evaluation of the CW programme in Princeton, British Columbia. Data collection and utilisation details are summarised in Table 1.

The data collection protocol for this quality improvement study was submitted for a review as per A Project Ethics Community Consensus Initiative guideline and a second review was provided through the Quality Improvement Board and the Privacy Information Department at the IH Authority. The protocol was exempt from research ethics review, as per the Tri-Council Policy Statement guidelines. Consent was sought from the participants for the focus group discussions, consulting sessions and CW feedback.

Data analysis

Quantitative data

Overall, programme capacity and utilisation were determined by calculating frequencies, averages and median scores for services provided, as recorded in the CW monthly and financial reports. Network analysis was determined by categorising all logged CW services for the duration of the programme and determining the types and frequencies of referrals. Gephi open graph platform programme (<https://gephi.org/>) was used to depict the strength and vastness of the CW reach to various service agencies. These services were also categorised based on function, for example, financial support and tabulated to highlight the type of supports needed most.

Number of visits to primary care providers and the emergency department was collected by CB from the shared EMR and consolidated for clients based on their programme referral date as the base point. Number of visits was counted for 1 year prior and post referral. Conservative inclusion criteria were implemented ensuring that the client was a resident of Princeton and was not receiving primary or emergency care anywhere else during that time. As well, it was ensured that the data were complete for the full year prior and post referral, i.e., clients were enrolled in the programme early enough to ensure that, at minimum, a full year of data were available post referral.

Table 1: Overview data sources and utilization

Data type	Data source	Data details	Data utilization purpose
Quantitative	Monthly CW reports	November 1, 2015 to March 31, 2019	Caseload, attachment, and capacity
	Division of family practice and OneSky (contractor)	Programme cost summary for fiscal years: 2015/16, 2016/17, 2017/18	Cost of programme delivery
	CW service log	Client records from March 2015 to March 2019	Network analysis: Scope of work, types of services, frequency of contacts
	EMR	Number of visits to ED and primary care provider one year prior and after enrollment in programme	Impact on emergency department and primary care services
Qualitative	Interior health authority strategic information unit	Health system data from January 1, 2015 to August 31, 2019 ^a ED visits, CTAS distribution, admissions, visits by presenting complaint	Comparison of emergency department utilization
	Primary care provider and integrated team focus groups	Total of 25 participants: providers, CWs, local leadership, integrated team members. Three 1 h focus group discussions, two 1 h interviews	In-depth understanding of community worker integration in primary care services
	Information and consulting sessions	4×1 h sessions with working group, consisting of 3 providers and 2 CWs	Context, elaboration and clarification of themes
	Feedback from community workers	Written responses from 2 (current and past) CWs	Reflection of community workers on the programme, including facilitators and CW characteristics for success

CW: Community outreach workers, CTAS: Canadian Triage Acuity Scale, ED: Emergency department, EMR: Electronic medical record

Qualitative data

During semi-structured focus group discussions, participants were asked about programme outcomes, observable benefits to the clients, challenges of the programme, qualities of a successful CW, impact of the programme on the providers and their satisfaction. Discussions continued until a saturation point was reached. Content was thematically analysed and presented to participants afterwards, ensuring comprehensiveness and representativeness.

RESULTS

Programme structure and capacity

The programme studied was delivered by the South Okanagan Similkameen Division of Family Practice and contracted to OneSky Community Resources which covers expenses incurred by their contracted staff, including onboarding, travel and meetings. The CW position was out of the scope of any union and was provided outside of the regional health authority. Since its inception, a total of 1065 visits were provided and 376 referrals were executed to community services. Monthly, the CW provided 64 h of service, averaging 15 clients, 28 visits and

10 executed referrals. The programme facilitated 142 client attachments to a primary care provider. This was an unexpected benefit, as referrals stem from providers. Therefore, facilitation of attachment resulted from unattached clients entering the emergency department. The overview of programme structure and organisation is summarised in Table 2.

Characteristics of clients referred to the programme

Although there are no specific criteria needed to be referred to the programme, the common persona of clients consists of having undiagnosed or unassessed low cognitive functioning, lower IQ, mental illness and/or learning disability. Clients may also be elderly with no children or family nearby and are unable to seek supports themselves. Functionally, the population is similar to that served by the community mental health worker (CMHW) programme; however, the CW programme fills the gap by focusing on clients with undiagnosed mental health and/or cognitive disability.

There were two types of clients: Those who required short-term assistance and complex-needs clients. Short-term assistance was typically more straightforward, where linking the client to a certain service or providing information on a

Table 2: Overview of programme organization

Responsibility	Division of family practice	Providers	Primary contractor	Sub-contractor	Community worker
Contract and funding	Develop contract with primary contractor Identify deliverables Secure funding		Develop contract with division Human resources Consult on description	Develop contract with primary contractor Identify deliverables	
Onboarding				Advertise position	
Job description				Arrange logistics for hiring and selection committee	
Advertising					
Interviewing and selection					
Programme expenses	Covers expenses incurred by providers for contract, onboarding, and meetings related to programme		Expenses incurred by their staff for contract, onboarding and meetings	Covers time, travel etc., expenses incurred by staff Expenses for delivering programme (e.g., travel, administration)	Documents all expenses incurred while delivering programme
Salary					
Administrative costs					
Office and equipment					
Incidental expenses					
Electronic medical records	Basic EMR training	Grant access to EMR			Adhere to privacy and confidentiality policies
Access	Confidentiality agreement education and enforcement				
Confidentiality agreement	Privacy policies				
Monitoring and oversight					

EMR: Electronic medical record

service would suffice. Complex-needs clients were those who require more than one type of support from the CW and for an extended time (several months). Often, complex clients will require recurring support, depending on their life events.

Integration of the community outreach workers in primary care

Being an integral part of the team, CWs participate in team huddles, discharge planning and share the EMR system through which they communicate with providers and receive client referrals. As a result, CWs reported ease of communication, support and respect from providers who prioritise consultation with the CW.

Facilitators to successful programme delivery

Focus groups and consultation sessions revealed several factors required for a successful delivery of the programme:

- Community need for services and availability of resources to connect clients
- Stability of financial support
- Provider support and integration with the primary care team through shared EMR and discharge planning

- Nimble and adaptive structure that allows a response to population needs
- Role definition and clarity
- Strong, trusting relationship among the CW, client and provider.

Adaptability of the CW was identified as a key personality characteristic required to be successful, as CWs are required to develop responsive action plans during their first meeting with the client. Additional personality characteristics listed by the focus group included flexibility, outgoingness, resourcefulness, patience, trustworthiness, reliability and discretion. Previous experience navigating social and health service organisations were also listed as an invaluable knowledge.

Impact on providers

As the programme was initiated as a response to providers' needs for better client-centered care, numerous positive outcomes were reported that extend to clients, including:

- Improved wellness and reduced burnout resulting from increased confidence that clients were appropriately supported outside of the clinic

- Enabled full scope of practice, as providers no longer needed to complete tasks within CW scope
- Improved traction in treatment plans, as clients were connected to resources, for example, PharmaCare programmes
- Reduced *no shows* to medical appointments.

Impact on the healthcare system

JP and CB reviewed the number of appointments of their complex clients ($N = 45$) who were enrolled in the programme. A subset of 10 clients was selected based on availability of data 1 year prior and post-enrolment in the programme. This was done to control for confounding extraneous circumstances, such as moving outside of the service area. Although this is a conservative sample, it ensured availability of a complete history of visits 1 year prior and post-enrolment in the programme.

As shown in Figure 1, on average, in a year prior to enrolment in the CW programme, complex clients saw their primary care provider 6.5 times, ranging anywhere from 0 to 32 visits and visited the emergency department 2.7 times, ranging from 0 to 15 visits. Within a year after the enrolment, the number of visits to the primary care provider increased by 6%–6.9% visits, ranging from 1 to 31 visits. These visits were also described as more effective and appropriate by the providers. The number of emergency department visits decreased by 41%–1.6% visits. When considering that the average cost of emergency department visits in this area is \$5845, the estimated cost decreased from \$15,782 the year before enrolment to \$9352 (\$935 per client, per year).

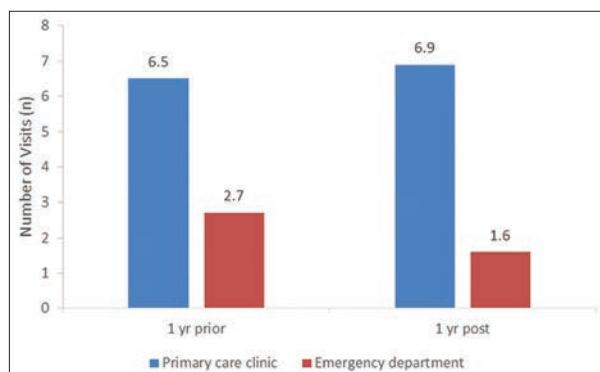


Figure 1: Number of visits to primary care provider and emergency department.

The providers corroborated these findings with their observations and recognised that there were fewer visits to the emergency department and the visits were more appropriate. By providing regular visits to the provider and ensuring that the client adhered to the treatment plan, the conditions for the clients were stabilised, which allowed a reduction in emergency department use.

The CW programme enabled an appropriate use of health-care services. Clients in the CW programme showed increased length of stay during ED visits (198 min), compared to when not in the programme (175 min). These findings indicated that once in the programme, the clients who were admitted were admitted for slightly longer. Furthermore, the presenting complaints to the ED varied when clients were in the programme compared to when they were not. The top three presenting complaints for clients in the programme included respiratory (18%), cardiovascular (15%) and orthopaedic (14%) concerns. For these same clients, when outside of the programme, the top presenting complaints were orthopaedic (17%), general and minor (14%) and mental health and substance use (12%). As indicated by providers, these general and minor and mental health and substance use complaints were better handled in the primary care setting and not the emergency department.

Network built by community workers

CWs support clients by building supports and networks to various agencies and services. This support can be based on temporary support or could require reaching out to numerous services with extensive follow up. An example of temporary support includes providing informational pamphlets. More complex support would include managing a sale of a large farm and moving clients to long-term care. The most common tasks performed by CW, and as reported by providers and CW, include:

- Determining resources a client needs and connecting clients to these resources
- Applying to various programmes, including PharmaCare, social support, disability, pension, etc.,
- Phone or in-person follow-up with agencies
- Bringing clients to their appointments with primary care providers, specialists and community (e.g., income tax, etc.)

In total, the CW connected clients to 60 various local, regional, provincial, and federal resources that included social services, financial support, mental health and health care. To gain an in-depth understanding of the extent of the network created by the CW, a review of referrals was conducted and quantified. Referrals from the inception of the programme to 31st March, 2019 were collated and categorised based on the main themes [Figure 2]. For example, the financial category represented services, including support with income tax, completion of forms for disability and networking with accountants.

A network analysis was conducted for a more representative overview of network vastness the CW provides and is shown as Figure 3. It is evident that the CW plays an essential role in the community as the connector and navigator of numerous resources for their clients, which otherwise would be a responsibility of the primary care provider or no one. It is evident that the most frequent connections made by the CW are to primary care providers, followed by Services BC, Persons with Disabilities services, PharmaCare and securing travel to out-of-town appointments.

Cost of the programme

On average, the programme cost \$26,000 per year for 64 h of service per month. This included the salary, benefits, administrative costs and travel expenses. The position was primarily self-directed with close relationships with providers; therefore, supervisory costs were considered to be minimal and not included. Provided that an average visit to the emergency department in Princeton costs \$5845,¹⁷ the services provided by the CW would need to prevent 4.5 visits per year to recover the

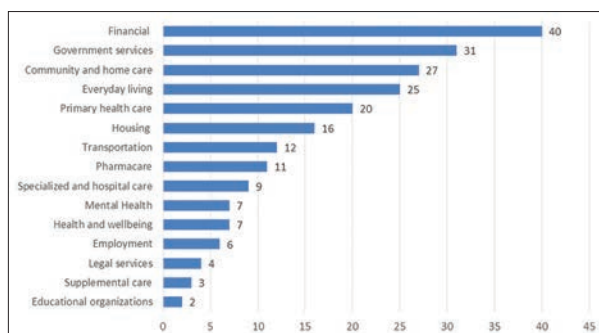


Figure 2: Type and frequency of services connected by community worker.

cost of the programme. The CW programme costs are summarised in Table 3.

Before the delivery of the programme, providers would carry out tasks now allocated to the CW. Therefore, the time allocation can be assumed to be 1:1, where providers would spend approximately 64 h per month, distributed among them, providing CW services. This would translate to approximately \$9900 per month, or \$118,800 annually.

DISCUSSION

Since the implementation of the CW programme in rural British Columbia the community, providers, and CW have used the position to best service their clients. The conducted quality improvement study provides a realist evaluation of the programme. The results show that the

Table 3: Community outreach workers programme cost (CAD \$) breakdown for 3 consecutive fiscal years, based on 64 h of service per month

	2015/16	2016/17	2017/18
Total wages and benefits	20,259.01	22,033.99	22,015.50
Administration costs	1262.87	2808.94	979.98
Facility costs	1650.57	1453.24	349.46
Professional services	218.22	86.00	53.00
Programme costs	387.44	344.47	154.39
Telephone	53.41	381.32	1040.49
Training expenses	4.20	N/A	327.25
Travel expense	1790.00	379.52	325.50
Other	N/A	N/A	18.55
Total	25,625.72	27,487.48	25,264.12

N/A: Not available, CAD: Canadian dollars

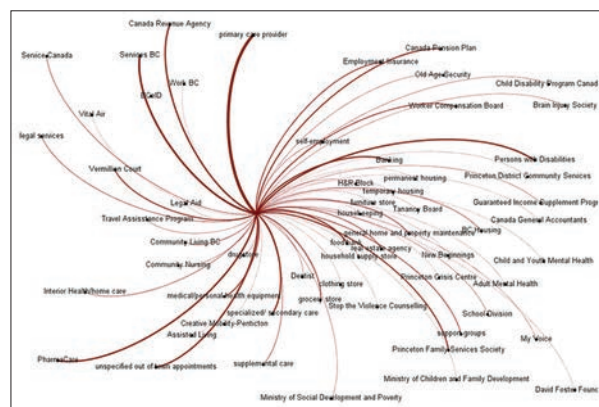


Figure 3: Reach of the network facilitated by the community outreach worker. The thickness of the line represents the strength of the relationship between the CW and services connected in relation to other services.

position is highly valued within the community, serves a sub-population that has 'fallen through the cracks' created by the system, and has substantial impact on the primary care providers and the health-care system. The major enabler of the programme is full integration of the CW as part of the primary care team, consistent funding and nimbleness of the position allowing responsiveness to population needs.

Limitations

A limitation of this study is that it is a retroactive approach. When the programme was developed by the province, it did not have a robust evaluation framework, especially when considering return on investment. The authors recognise this limitation and have approached the evaluation more conservatively. In addition, since inception of the programme, there was no in-depth external evaluation conducted or systematic approach to quality improvement. Changes were made to the programme on an as-needed basis, with little documentation. A systematic approach to monitoring of this programme is recommended to ensure its optimisation.

CONCLUSION

The CW programme is a cost-effective means of supporting primary care providers and clients, while reducing the cost to the emergency department. However, the programme remains under a continuous threat due to low support and recognition by the provincial Ministry of Health, making it ineligible for funding in the current health-care system transformation. With the changing primary health-care landscape in British Columbia, there is an unprecedented opportunity to economically and effectively enhance client outcomes by bridging primary care needs and sociopsychological challenges.

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The SRPC would like to express our support for all of those responding to COVID-19 committed to providing safe and quality care to patients across Canada.

Join the RuralMed and or Rural Anesthesia Listservs. A lot of useful, detailed COVID-19 information has come from these email lists and has proven to be a great resource.

A working group with representatives from all the provinces and territories with isolated fly-in communities has been formed to share concerns and offer advice. We will keep you posted on further initiatives.

Together we can work towards keeping everyone connected, safe, and up to date. Visit the SRPC.CA home page to find links to these pages.

COVID-19 RESOURCE GUIDE
COVID-19 RURAL MED LISTSERV RESOURCES
COVID-19 PATIENT RESOURCE PAGE

Assessment of rural emergency department physician staff, hiring practices and needs

Zachary Hallgrimson,
BSc¹,

Anne-Marie Friesen,
B.ScN, RN¹,

Darmyn Ritchie, MSc,
MD²,

Douglas Archibald,
PhD³,

Charles Su, BSc, MD
CCFP (EM), FCFP^{4,5}

¹Department of
Medicine, Faculty of
Medicine, University of
Ottawa, Ottawa, Canada,

²Department of Family
Medicine, University of
Calgary, Calgary, Canada,

³Department of Family
Medicine, University of
Ottawa, Ottawa, Canada,

⁴Department of Emergency
Medicine, Director of
Distributed Medical
Education, University of
Ottawa, Ottawa, Canada,
⁵Department of Family
Medicine, University of
Ottawa, Ottawa, Canada

Correspondence to:
Zachary Hallgrimson,
zball051@uottawa.ca

Access this article online

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www.cjrm.ca

DOI:
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Abstract

Introduction: Rural communities suffer from an unequal access to health-care resources. The purpose of this study was to characterise Emergency Departments (EDs) in the Champlain Local Health Integration Network (LHIN) and determine their barriers to recruitment and retention of emergency physicians. **Methods:** A survey was sent to the 17 ED chiefs in the Champlain LHIN area by E-mail through May to December 2019. Results were analyzed for common themes and trends.

Results: Seven of the 17 hospitals responded to the survey. The average number of physicians staffing the ED was 16, with the majority being Canadian College of Family Physicians certified without additional emergency training. Common described barriers to recruitment include lack of incentives for physicians to work in rural communities, lack of available resources at rural centres, such as specialists and poor flexibility in terms of shift coverage. Barriers to retention included limited incentives to remain in rural communities.

Conclusion: This study analyzed the demographics and barriers to recruitment and retention in rural EDs. These results can be used to help build strategies that encourage physicians to practise in rural EDs.

Keywords: Emergency departments, recruitment, retention, rural emergency departments, rural medicine

Résumé

Introduction: Les communautés rurales souffrent d'un accès inégal aux ressources de santé. Cette étude visait à caractériser les services du Réseau local d'intégration des soins de santé (RLISS) Champlain et à déterminer quels étaient les obstacles au recrutement et à la rétention des urgentologues.

Méthodologie: Dix-sept urgentologues en chef de la région desservie par le RLISS Champlain ont reçu un questionnaire par courriel entre les mois de mai et décembre 2019. Certains thèmes et tendances sont ressortis de l'analyse.

Résultats: Sept des 17 hôpitaux ont répondu au sondage. Le personnel des services d'urgence comptait en moyenne 16 urgentologues, et la majorité était certifiée par le CMFC (Collège des médecins de famille du Canada) sans autre formation en médecine d'urgence. Les obstacles au recrutement fréquemment cités étaient:

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Absence d'incitatif pour attirer les médecins dans les communautés rurales, absence de ressources dans les hôpitaux ruraux, tels spécialistes, et mauvaise flexibilité en matière de quarts de travail. Le peu d'incitatifs pour demeurer dans les communautés rurales était le principal obstacle à la rétention.

Conclusion: Cette étude a analysé les caractéristiques démographiques et les obstacles au recrutement et à la rétention dans les services d'urgence en milieu rural. Ces résultats peuvent servir à concevoir des stratégies qui encouragent les médecins à pratiquer dans les services d'urgence des hôpitaux ruraux.

Mots-clés: Recrutement, rétention, médecine rurale, services d'urgence, urgence rurale

INTRODUCTION

Rural communities often face barriers to medical care ranging from a lack of medical resources¹ to struggles recruiting physicians.² A detailed analysis of physician locations in Canada found that while 21.4% of Canada's population resides in rural communities, only 9.4% of physicians practised in these areas.³ To fill this void, Canadian rural emergency departments (EDs) employ more family physicians compared to their urban counterparts.³ Further, since Canada has different pathways to emergency physician (EP) work (no extra training, Canadian College of Family Physicians [CCFP]), a 1-year certification programme under the College of Family Physicians of Canada (CCFP-EM), practice eligibility programme under the CCFP-EM and a 5-year residency programme under the Royal College of Physicians and Surgeons of Canada, physicians of different levels of training may be found working in rural EDs.

To understand emergency care in rural communities, one must examine both the current demographics of rural EDs and the obstacles they encounter when they recruit physicians. For example, *The British Columbia Needs Assessment* and testimonials from physicians working in Timmins, Ontario found that positive experiences with rural medicine and strong working relationships motivated people to work in rural centres, whereas lack of support from health-care systems and demands of office practice decreased their desire to practise rurally.^{4,5} As each area has its unique challenges and barriers, it is important to analyse each community so that strategies can be best tailored to their needs.

This study seeks to better understand the demographics and barriers to recruitment and retention for ED in the Champlain Local Health Integration Network (LHIN) area through questionnaires administered to ED chiefs. This analysis could help to guide future discussions that can be made to

increase the number of physicians practising rurally, thus increasing patients' access to care.

METHODS

The 17 ED chiefs in the Champlain LHIN were contacted by E-mail through May to December 2019. A consent form was signed by the participating physicians. ED chiefs were sent a survey through *Survey Monkey*⁶ composed of 34 questions that sought to determine the demographics of their ED, as well as barriers to recruitment and retention. The full survey is available from the authors. This study was exempt from review from the Ottawa Health Science Network Research Ethics Board at The Ottawa Hospital as it was deemed a quality improvement project.

RESULTS

Emergency department demographics

Of the 17 hospital ED chiefs contacted, 7 responded to the survey. Table 1 outlines the number of physicians and their level of qualification in each hospital. The average number of physicians working in the ED was 16 with 5 hospitals feeling that they currently had enough EPs to staff their ED and only 1 hospital reported having sufficient EP staff to cater to future demand. CCFP without EM training comprised the majority of EP staff.

Physician recruitment

FRCP-EM trained physicians were described as being very difficult to recruit by 5 hospitals and difficult to recruit by 2 hospitals. CCFP-EM trained physicians were described as moderately difficult to recruit by 4 hospitals and difficult to recruit by 2 hospitals. The remote location was reported as the most common barrier (3 hospitals), followed by lower wages received by rural

Table 1: Hospitals' responses to questions regarding characteristics of emergency departments

Table 1: Hospital responses to questions regarding characteristics of emergency departments								
	Hospital characteristics							
How many physicians do you currently have on your roster?	20	24	5	15	18	12	18	Mean: 16 Median: 18
How many are CCFP (EM) certified?	5	1	0	1	13	1	3	Mean: 3.4 Median: 1
How many are FRCP-EM certified?	1	6	0	0	2	0	0	Mean: 1.3 Median: 0
If physicians working in your ED hold other residency training, please list their respective certification types and how many physicians with that type	2: CCFP- Anaesthesia	1 US: FAAEM	0	1: Palliative Care	0	0	5 CCFP-CA (anaesthesia) 4 CCFP with extra OB training	
How many of your emergency physicians also have a family practice?	8	10	5	4	2	4	9	Mean: 6 Median: 5
What is the average annual number of patients seen in your ED?	23,000	17,100	18,000	12,000	19,000	18,000	18,000	Mean: 17 871.4 Median: 18 000
What do you anticipate the annual volume of your ED to be in 2 years?	25,000	19,000	18,000	14,000	22,000	18,000	19,000	Mean: 19 285.7 Median: 19 000

CCFP: Canadian College of Family Physicians, EM: Emergency medicine, FRCP-EM: Federal rules of civil procedure-EM, ED: Emergency departments, CAC: Certificate of added competence, FAAEM: Fellow of the American Academy of EM, US: United States, OB: Obstetrics

physicians (2 hospitals). Additional described barriers included the lack of additional specialties for consults/coverage/call, competition with other EDs to recruit physicians, lack of incentives for physicians to practise in rural communities, poor flexibility in terms of shifts/coverage and lower acuity of cases. The implementation of electronic medical records was highlighted as a potential future barrier by 1 hospital. Two hospitals reported no current barriers to recruitment.

Described strategies to increase recruitment were offering training positions in hospital during residency (1 hospital), approaching training facilities for interest and availability (1 hospital), word of mouth (4 hospitals), recruitment fairs (1 hospital), offering shifts through Health Force Ontario's ED

Locum Programme (3 hospitals), social media (1 hospital) and referrals from other physicians (1 hospital). In addition, 3 hospitals used the help of outside resources for recruitment. Five hospitals are currently recruiting with the time it takes to find physicians variable, taking anywhere from a few weeks to months and even years. All hospitals offer placements for residents with 6 also offering medical school student places. Three of these hospitals found that student positions are regularly filled. Three hospitals have had locum physicians in their hospital in the past 5 years. One ED had a staff of 5 physicians and used locums for 23–27 shifts per month. In 4 of the hospitals, locum physicians occupy placements on a weekly basis, one of them specifying that they work certain shifts on a regular basis.

Barriers to retention

Once hired, 3 hospitals reported difficulties in retaining their EPs as they either opt to take a different trajectory in their career or because they are independent contractors and work elsewhere. Additional described barriers include limited incentive to remain in a smaller community with little support, reduced support with increasing patient loads, conflicts with hospital administration and isolated communities.

DISCUSSION

Rural communities have reduced access to health care and health-care resources.¹ To guide solutions, an examination of current barriers to recruitment and retention within rural EDs is needed. This study attempts to address this by administering questionnaires to ED chiefs within the LHIN area.

Of the EDs that responded to this survey, CCFP-trained physicians without additional emergency medicine certification composed the majority of the departments' staff. It was also found that some EDs rely on locum physicians for coverage. One ED had 5 physicians on staff and used locums for 23–27 shifts per month. This finding is comparable to a study that examined 25 ED in South-Western Ontario which found that only 29.3% of physicians working in EDs had formal EM training.⁷ Similarly, a study that examined 23 rural EDs throughout Québec found that 6% of the EPs held additional emergency certifications.⁸

The reported barriers to recruitment were similar to those described in *The British Columbia Needs Assessment*. One of the most common barriers was lack of support in rural communities from the health-care system or colleagues.⁴ This supports the need for the government to incentivise physicians to work in rural communities to help overcome the increased difficulty of working in departments with decreased levels of support. Further, a known strategy to increase recruitment to rural communities is rotations for medical students and residents.⁹ Interestingly, only 4 of 6 hospitals found that medical student spots were regularly filled, suggesting a missed opportunity for student exposure.

Limitations

There are limitations to this study. First, only 7 out of 17 hospitals responded to this survey,

suggesting that these results do not provide a complete description of LHIN EDs and limiting this study's external validity. Further, there is a potential for response bias to the administered questions. There is potential questionnaire bias as the study results were derived from a questionnaire that was not labelled as standardised. The authors attempted to reduce this bias through a comprehensive literature review when designing the questionnaire and using focused questions to address the aims of this study.

CONCLUSION

This study examined EDs within the Eastern Ontario area and reported the barriers to recruitment and to retention of EPs. Common barriers were a lack of support and incentives by rural physicians to practise in these communities. These results can help guide future strategies to increase rural EP recruitment.

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Intravenous iron therapy in a rural hospital: A retrospective chart review

Ribal Kattini¹,
Jenna Poirier, BSc¹,
Lauren Minty, MD²,
Danielle LaJuenesse,
RPh³,
Len Kelly, MD,
M Clin Sci, FCFP,
FRRM⁴,
Sharen Madden MD,
MSc⁴,
Robert Minty,
MD, FCFP⁴,
Sydney Larsen, MD²,
Ruben Hummelen,
MD, PhD⁴

¹Sioux Lookout Local
Education Group, Sioux
Lookout, ON, Canada,
²Northern Ontario School of
Medicine, Thunder Bay, ON,
Canada, ³Sioux Lookout
Meno Ya Win Health
Centre, Sioux Lookout, ON,
Canada,

⁴Division of Clinical
Sciences, Northern Ontario
School of Medicine, Thunder
Bay, ON, Canada

Correspondence to:
Len Kelly,
lkelly@mcmaster.ca

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Abstract

Introduction: Intravenous iron infusion therapy is commonly delivered in rural hospitals, but there are no common guidelines for dosing or choice of agent. The objective of the study was to understand present practice and alternate therapies and develop practical recommendations for small hospital use.

Methods: This was a retrospective chart review of all non-dialysis patients aged 15 years or older who received iron replacement therapy at Sioux Lookout Meno Ya Win Health Centre from May 2013 to May 2019 and a literature review of available iron preparations.

Results: Of the 147 patients who received intravenous iron replacement, 75 were administered a single dose of 200 mg or 500 mg iron sucrose. Commonly used in pregnant patients, an increase in haemoglobin by an average of 9.2 g/L followed a 200 mg dose and 12.5 g/L after 500 mg. The 3-h infusion time for the 500 mg dose consumed considerably more nursing resources. Non-pregnant patients can be transfused more effectively with iron maltoside which can efficiently deliver larger doses of iron.

Conclusion: We recommend iron maltoside for efficient intravenous iron replacement in non-pregnant patients and single or multiple doses of 200 mg iron sucrose during pregnancy.

Keywords: Intravenous iron infusion therapy, iron maltoside, rural medicine

Résumé

Introduction: La perfusion intraveineuse de fer est fréquente dans les hôpitaux ruraux, mais il n'existe pas de lignes directrices courantes sur la posologie ou le choix de l'agent. Cette étude visait à comprendre la pratique actuelle, et les autres options thérapeutiques et d'émettre des recommandations pratiques à l'intention des petits hôpitaux.

Méthodologie: Revue rétrospective des dossiers de tous les patients de 15 ans et plus non sous dialyse qui avaient reçu une supplémentation en fer à l'Hôpital SLMHC entre les mois de mai 2013 et mai 2019 et revue de la littérature sur les préparations de fer commercialisées.

Résultats: Sur les 147 patients ayant reçu une perfusion de supplémentation en fer, 75 ont reçu une dose unique de 200 mg ou de 500 mg de fer-saccharose. Fréquemment utilisées chez les femmes enceintes, les doses de 200 et de 500 mg ont augmenté le taux d'Hb d'en moyenne 9,2 g/L et de 12.5 g/L, respectivement. La perfusion de 3 heures nécessaire à la dose de 500 mg a utilisé considérablement

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plus de ressources infirmières. Le fer-isomaltoside, qui administre efficacement des doses supérieures de fer, est perfusé plus efficacement chez les patients, à l'exclusion des femmes enceintes.

Conclusion: Nous recommandons le fer-isomaltoside pour la supplémentation en fer efficace chez les patients, à l'exclusion des femmes enceintes et une dose unique ou multiple de 200 mg de fer-saccharose durant la grossesse.

Mots-clés: Fer-isomaltoside, médecine rurale, perfusion intraveineuse de fer

INTRODUCTION

Intravenous iron is a useful and rapid treatment of iron deficiency anaemia for patients who have failed or cannot tolerate oral iron therapy and it reduces the need for blood transfusions.¹ Iron replacement therapies vary; small rural hospitals must navigate options of multiple agents, doses and infusion rates.² Oral iron replacement is sufficient for most patients with iron deficiency anaemia, but for patients within 6 weeks of elective surgery or parturition, intravenous iron may be needed for a more rapid treatment.¹

Previous generations of intravenous iron preparations were associated with adverse side effects including anaphylaxis, now rare with newer formulations. These bind iron more closely to the carbohydrate molecule, resulting in less free iron and fewer adverse reactions. The risk of anaphylaxis with first exposure to iron sucrose is <1:250,000 versus 1:50,000 for a blood transfusion, which carries the additional risk of transmission of infectious disease.³⁻⁶

A decade ago, physicians at the Sioux Lookout Meno Ya Win Health Centre (SLMHC) were using a variety of formulations for iron replacement therapy. In 2013, this was standardised to the use of a single agent, iron sucrose, chosen for its safety profile, ease of administration, lack of a required test dose and alignment with medication coverage by the Non-Insured Health Benefits Programme (NIHB), so that similar agents were available both in hospital and remote nursing stations.^{2,7} Doses included both standard (200 mg) and high dose (500 mg) infusions.^{8,9} This report presents the results of 6 years of single-dose iron infusion data. We list the intravenous iron preparations presently available in Canada and discuss issues for ongoing protocol development, including multiple dose requirements.

METHODS

SLMHC provides medical and laboratory services to a catchment of 29,000 primarily First Nations patients in the town of Sioux Lookout and 26

northern communities. The setting is unique as patients often travel distances of over 300 km from their remote community by fixed wing airplane to access surgery or obstetrical care.⁹ Obstetrical patients late in a pregnancy or pre-operative patients <6 weeks with iron-deficient anaemia who are newly diagnosed or have failed oral therapy often require effective iron replacement.¹⁰⁻¹³

A retrospective chart review of all non-dialysis patients aged 15 years or older who received iron replacement therapy at SLMHC from May 2013 to May 2019 was undertaken. Data included patient demographics, diagnosis, dose, infusion duration and adverse effects, baseline and follow-up haemoglobin (Hb) at 7–30 days, mean corpuscular volume (MCV) and ferritin. The focus was on the relative effectiveness of 200 mg versus 500 mg doses of iron sucrose.

Data on single and multiple-dose infusions were collected, but analysis was limited to data on single-dose infusions. Patients were excluded if they had no follow-up blood work within 7–30 days of treatment. Iron infusion and dispensing data were collected from hospital charts and from the hospital pharmacy dispensing programme. Adverse events were documented by SLMHC staff; the protocol for patients receiving intravenous iron requires constant nursing observations and vital signs every 15 min. Ethics approval was granted by the SLMHC Research Review and Ethics Committee.

RESULTS

A total of 147 patients received intravenous iron replacement. Patients (n=18) with no recorded follow-up blood work 7–30-day post-infusion were excluded. Of the remaining 129 patients, 75 received a single dose infusion and 54 received multiple doses. The average time of follow-up Hb post-infusion was 18 days (range 7–29).

Most of the 75 single-dose patients (64%) received iron sucrose for anaemia in pregnancy; the mean age was 32 years. The average pre-infusion

Hb was 92 g/L with an MCV of 75 fl [Table 1].

Only 2 patients had documented adverse effects of dizziness, headache and mild pruritus not requiring infusion interruption or treatment.

The Hb response to a single 200 mg dose of iron sucrose was 9.2 g/L and 12.5 with a 500 mg dose ($P = 0.13$). Infusion times were 2 h longer for the higher dose [Table 2]. Only one chart contained a calculation of total iron deficit. Ferritin levels were available on 5 patients and all were below normal.

Ongoing protocol development will consider including routine ferritin measurement and standardising the estimation of total iron deficit by making the modified Ganzoni formula readily available to clinicians [Table 3].^{15,16} While computing the iron deficit is ideal, applying the Ganzoni formula to adults (60–100 kg) with a Hb level of 80–100 g/L results in an estimated total iron deficit of 1200–1700 mg [Table 4]. Rapid total replacement with iron isomaltoside can be initiated with a maximal dose of 1000 mg, with Hb reassessment in 1–4 weeks.^{9,17,18}

DISCUSSION

The haemoglobin response to a single 200 mg dose of iron sucrose was slightly lower than a 500 mg

dose ($P = 0.13$) but required far less nursing time. In a busy clinical setting, this was a significant practical consideration.

The Hb rise of 9 g/L following a 200 mg infusion is consistent with other studies; a 2013 meta-analysis of 75 iron replacement trials (42 using iron sucrose) found a mean increase of 6.5 g/L with an associated 26% decrease in blood transfusions.¹ The use of a 7–30-day follow-up Hb reassessment is standard in iron replacement studies, as 50% of the response occurs by day 5 and 100% by 21 days.¹⁹

Our average pre-infusion Hb of 92 g/L is considered a moderate iron deficiency anaemia (severe <80), and intravenous replacement is recommended if <6 weeks from parturition or elective surgery.^{20,21} The follow-up Hb value of 102 g/L brings the patient over a common clinical benchmark of >100 g/L but is below the ideal recommended pre-operative Hb level of 130 g/L.²¹ The paucity of ferritin measurements indicates that most clinicians in this setting identify iron-deficient anaemia by a Hb under 100 g/L with a microcytic MCV (<80 fl) in high-risk populations (obstetrics and pre-surgery).

There are several considerations in standardising iron replacement therapy. The choice of agents, safety in pregnancy, ability for maximal iron deficit correction in one infusion and cost are all relevant.

All intravenous iron preparations are used off-label during pregnancy and are thought to be safe in pregnancy.²² Most authors agree that intravenous iron should be avoided in the first trimester, but beyond that there is limited consensus on what agent to use.^{13,23} In our setting, iron sucrose was initially chosen due to its common use in pregnancy and its excellent safety record.^{24,25} It is generally given every 2 days and one of its limitations is the maximal single dose of 500 mg which we found impractical.^{2,12}

Table 1: Gender, age, diagnosis and baseline haematology of Sioux Lookout Meno Ya Win Health Centre patients receiving intravenous iron from 2013-2019 for the treatment of iron deficiency anaemia

	Single infusion (n=74)	All single and multiple infusions (n=129)
Age, mean±SD	32.3±17.1	35.9±19.0
Female, n (%)	70 (93)	115 (89.1)
Indication, n (%)		
Anaemia in pregnancy	48 (64)	66 (51)
Other iron deficiency	25 (36)	60 (47)
Pre-operative anaemia	2 (3)	3 (2)
Baseline Hb	91.9±11.6	90.2±12.5
Initial MCV	74.7±9.24	73.3±9.8

Hb: Haemoglobin, SD: Standard deviation, MCV: Mean corpuscular volume

Table 2: Changes in haemoglobin 7-30-day post-intravenous iron infusion

Dosage (mg)*	n	Time of infusion (h)	Mean±SD			95% CI**
			Baseline Hb	Hb post-infusion (g/L)	Change haemoglobin from baseline (g/L)	
200	37	1	93±10.2	102±12.7	9.2±8.4	7.267, 11.133
500	28	3	92±13.8	105±12.5	12.5±8.6	10.521, 14.479

*Missing data for 10 patients: 9 received 300 mg dose; 1 received 250 mg, **Change from baseline haemoglobin. Hb: Haemoglobin, SD: Standard deviation, CI: Confidence interval

While single iron sucrose appears practical for patients with a Hb in the 90s who need to be nudged over the 100 g/L mark, higher iron replacement requirements require multiple doses/visits. Our study did not analyse the 54 patients with multiple infusions due to the large variety of doses and schedules used by clinicians. This reflects a wide variety of clinical approaches, and perhaps, some confusion and standardising of the replacement of larger iron requirements would be a useful next step.

Of the three intravenous iron preparations presently available in Canada, only iron isomaltoside²⁶ can deliver a high dose of iron in one infusion [Table 5]. It was introduced in Europe in 2010 where it is used in pregnancy.²⁷⁻²⁹ It was approved in Canada for general use in 2018; as the 'new kid on the block', it is not yet widely used in pregnancy here, despite its acknowledged safety profile.²⁸⁻³² In Ontario intravenous iron is not covered by the Ontario Drug Benefits Plan, so the patient may be required to cover a cost of \$400–500, if the therapy is not covered by the hospital pharmacy. As a hospital expense, this will need to be balanced against the cost of

cancelling surgery. In our region travel to the hospital often requires airplane travel if a blood transfusion is required, while iron can be done safely in a patient's home community. Fortunately, the federal NIHB drug formulary covers the cost of both iron isomaltoside (Monofer) and iron sucrose (Venofer) for First Nations patients.⁷

Suggested dosing schedules have been developed. If rapid correction is not needed and the patient has easy access to the hospital (24,000 of 29,000 of our catchment area patients live remotely), repeat iron sucrose infusions are possible. Otherwise, iron isomaltoside²⁶ is a reasonable choice for more rapid, high dose iron replacement in non-pregnant patients, with a safety and efficacy record similar to iron sucrose.³²

Limitations

Despite a 6-year long audit period, our numbers for this analysis were small. There was insufficient data to analyse the Hb response of the 54 patients receiving multiple intravenous iron infusions for more severe anaemia; their doses and schedules varied greatly. The follow-up Hb measurements were over a 1–4-week period post-infusion, and standardised timing of follow-up testing would have allowed more rigorous analysis.

CONCLUSION

A 200 mg infusion of iron sucrose was practical in treating moderate anaemia. Higher

Table 3: Ganzoni iron deficit (mg) calculation for 80 (kg) adult with haemoglobin 90 (g/L)

Body weight (kg) × (target-actual [Hb g/L]) × 0.24 + 500	Iron deficit (mg)
80 × 60 (150–90=60) × 0.24 + 500	1652

Hb: Haemoglobin

Table 4: Estimated iron deficit (mg) by weight and haemoglobin level (g/L)

Weight (kg)	Hb 80 g/L	Hb 85	Hb 90	Hb 95	Hb 100
60	1508 (mg)	1436	1364	1292	1220
70	1676	1592	1508	1424	1340
80	1844	1748	1652	1556	1460
90	2012	1904	1796	1688	1580
100	2180	2060	1940	1820	1700

Hb: Haemoglobin

Table 5: Intravenous iron preparations available in Canada, common doses and number of infusions required for 1000 mg iron replacement

Generic name**	Trade name	Cost/mg (\$)*	Max single dose (mg)	I.V. infusion duration	Dosing for 1000 mg/number of visits
Iron isomaltoside	Monofer	0.47	1000	30–60 min	1000 mg × 1
Iron sucrose	Venofer	0.40	200–500	1–3 h	500 mg × 2 or 200 mg × 5
Sodium ferric gluconate	Ferrlecit	0.45	125	1 h	125 mg × 8

*Based on manufacturer's listed/wholesale price, **Iron dextran is discontinued in Canada¹⁴

dose (500 mg) therapy required substantially more nursing time. Further standardisation is required. Non-pregnant patients with larger iron deficits may benefit from the use of iron isomaltoside, which can deliver a higher amount of iron at one time. Documentation of the practices and results from other rural centres would assist our knowledge and understanding of the practical treatment of iron deficiency anaemia.

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The occasional maternal cardiac arrest

Andre N. Jakubow,
MD, CCFP (FPA)¹

¹Department of Anesthesia,
Sioux Lookout Meno Ya
Win Health Centre, Sioux
Lookout, ON, Canada

Correspondence to:
Andre N. Jakubow,
doctor@jakubowmd.ca

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INTRODUCTION

Cardiac arrest can suddenly afflict expectant mothers under the care of any physician and requires immediate, optimal treatment. Faced with this critical event, even experienced clinicians frequently omit or misapply the applicable consensus-based modifications to Advanced Cardiac Life Support protocols. A practical approach is presented for physicians responding to maternal cardiac arrest, including a discussion of resuscitative caesarean delivery (RCD), also known as perimortem caesarean delivery (PMCD) or resuscitative hysterotomy (RH). Human factors such as hesitation and opposition from other team members must be addressed in improving care delivery, as these can detract from the effective management of maternal cardiac arrest. More broadly, efforts must expand to maintain provider- and hospital-level readiness via a greater emphasis on PMCD in team-based critical event drills and resuscitation courses. Mothers, babies and families struck by maternal cardiac arrest deserve no less than our best and swiftest responses to this frightening but potentially rectifiable catastrophe.

CASE VIGNETTE

**Has been generalized for confidentiality and educational value.*

You are drifting back to sleep during an overnight obstetrics shift when an overhead alarm shatters the early morning silence. “Code Blue – Labour and Delivery”. You arrive to find your 28-year-old patient, previously healthy and actively labouring, now unresponsive, cyanotic and pulseless. The nurse exclaims between chest compressions, “She just suddenly clutched her chest and said she couldn’t breathe!” The cardiac monitor shows pulseless electrical activity (PEA). Intravenous access is being obtained. The patient’s husband, terrified, stands back from the bedside. Two minutes of ischaemia have already elapsed. *How do you respond?*

SOURCES OF INFORMATION

The PubMed database was searched using the terms ‘resuscitative hysterotomy’, ‘perimortem cesarean’, ‘maternal cardiac arrest’ and ‘neonatal survival’. For video resources, EMCRI.org was searched with the term ‘perimortem cesarean’. The relevant sections from the 2020 AHA guidelines¹ and a major resuscitation

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reference manual² and its citations were also reviewed. The sources deemed most relevant to clinical decision-making, technique, and expected maternal and neonatal outcomes are summarised below.

INCIDENCE AND AETIOLOGIES

While rare, with fewer than about 30 cases annually in Canada,³ maternal cardiac arrest can nonetheless present a challenge for clinicians caring for expectant mothers in any context. The most common aetiologies of maternal cardiac arrest include haemorrhage, trauma, embolism of amniotic fluid or thrombus, cardiorespiratory disease, drug toxicity, sepsis and pre-eclampsia.⁴

PROCEDURE AND CONSIDERATIONS

Expert-consensus-based departures from standard advanced cardiac life support (ACLS) protocols, while of low evidential quality, appear to improve maternal and neonatal survival^{4,5} yet are often omitted, even by experienced professionals.⁶ These include the following additional steps that can be summarised by the mnemonic “**Shove, Squeeze, Correct, and Collect to Cut at 4**” [Table 1].

1. **‘Shove’:** Provide left uterine displacement (LUD). An assistant standing on the patient’s left side should pull the uterus towards him/herself as far as necessary to reduce maternal aortocaval compression [Figure 1, Team Member #3]; this technique is considered less detractory from effective chest compressions than tilting the entire patient by 30°. If RCD is initiated, this assistant can move instead to the patient’s right side and push the uterus towards the patient’s left [Figure 2].
2. **‘Squeeze’:** Compress and ventilate the chest without interruption [Figures 1 and 2, Team

Members #1 and #2] in accordance with high-quality ACLS.

3. **‘Correct’:** Treat specific correctable causes promptly [Table 2]. The peripartum context may bring into play potentially toxic infusions such as magnesium sulphate or epidural bupivacaine. Any infusions that may be contributory to the arrest should be halted, and their antidotes given (respectively for these examples, calcium chloride and lipid emulsion). Suspected tension pneumothorax should be decompressed.
4. **‘Collect to Cut at 4’:** Immediately obtain tools and position the team physically and mentally for possible RCD. Although attempting to resuscitate the mother with foetus still *in utero* is the usual initial tactic, evidence increasingly suggests that separating the two parties may improve the chances of both surviving. As soon as this potential is recognised, the wise leader should not only ‘collect equipment’ by sending an assistant but also mentally ‘collect oneself’ and verbally orient the team to the possibility of imminent RCD, even if it is not ultimately performed.

RESUSCITATIVE CESAREAN DELIVERY: WHY. WHETHER. WHEN. WHERE. HOW.

The following principles inform decision-making around the ‘why,’ ‘whether,’ ‘when,’ ‘where’ and ‘how’ of RCD:

1. **‘Why’:** RCD may improve maternal and neonatal survival, and is unlikely to be detrimental to the mother. Delivery of the foetus and placenta may re-divert uterine blood into the maternal circulation.² A recent review⁴ judged 19 of 60 resuscitative caesarean deliveries under consideration ‘clearly beneficial’ to maternal survival, and none harmful. The AHA opines that “[a mother] cannot be declared ‘refractory’ to CPR and ACLS unless all interventions have

Table 1: Critical actions in maternal cardiac arrest

Left uterine displacement, chest compressions and ventilations, firm surface
Halt toxic infusions; intravenous access in upper extremity
If arrest cannot be reversed immediately, deliver foetus (usually by RCD), target <5 min (earlier still if injuries/prognosis are worse)
Remove foetal/uterine monitors before defibrillation/cardioversion (theoretical risk of injury)
Notify neonatal team
Rehearse critical events regularly; consider point-of-care checklists and ‘reader’ role

RCD: Resuscitative caesarean delivery

Table 2: Selected rapidly reversible causes to consider in maternal cardiac arrest

Aetiology	Possible antecedents/clues	Specific treatments (IV), for a typical 70-kg adult
Local anaesthetic toxicity	Epidural catheter migration into intravascular space, allowing large amounts of bupivacaine or lidocaine into circulation Recent epidural boluses	Stop epidural infusion Lipid emulsion 20% ('Intralipid') Initial bolus 1.5 ml/kg lean body weight (100 ml), then infusion ~0.25 ml/kg/min
Hypomagnesaemia	Preeclampsia treated with magnesium sulphate	Stop magnesium infusion Calcium chloride, 1 g
Hyperkalaemia	Inadvertent administration of IV potassium; renal failure; release of intracellular potassium, e.g. rhabdomyolysis; peaked T-waves on ECG	Calcium chloride, 1 g Sodium bicarbonate, 50 meq Salbutamol, 20 mg in 4 ml saline (nebulized)
Hypoglycaemia	Inadvertent insulin overdose	Stop insulin Glucose, 25 g (=1 ampule D ₅₀ W)
Eclampsia/preeclampsia	Hypertension, proteinuria, chest pain and/or headache	Magnesium sulphate, 4 g over 3 min
Tension pneumothorax	Blunt or penetrating thoracic trauma	Needle decompression Finger and tube thoracostomy
Ventricular fibrillation	Various	Defibrillation as per ACLS

ECG: Electrocardiogram, ACLS: Advanced Cardiac Life Support, IV: Intravenous

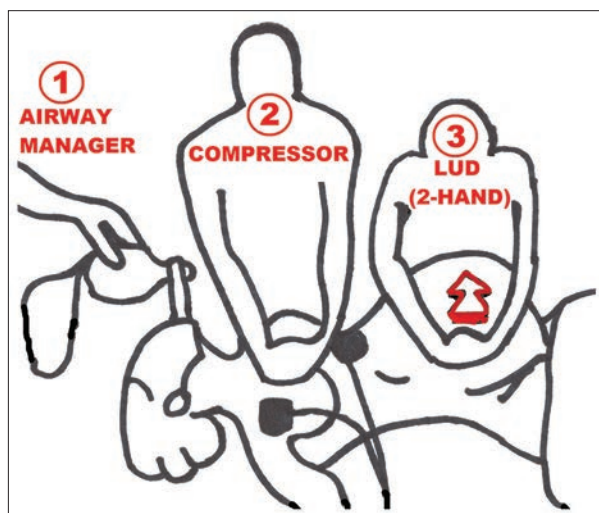


Figure 1: Team position before resuscitative caesarean delivery. LUD = left uterine displacement ('Shove' in mnemonic). Arrow = Team Member #3 pulls uterus towards patient's left flank. Illustrator: E. Chuah.

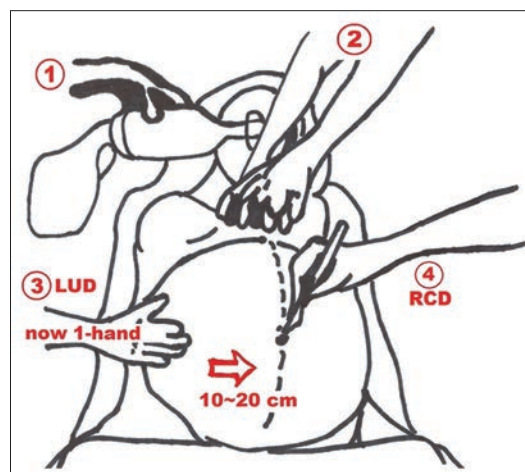


Figure 2: Team position during resuscitative caesarean delivery. Arrow = Team Member #3 pushes ('shoves') uterus towards patient's left flank, while Team Member #4 performs resuscitative caesarean delivery. Illustrator: E. Chuah.

been implemented effectively, including [RCD] when appropriate. No mother should die with a fetus left undelivered when there is aortocaval compression."²

2. **'Whether' #1:** Factors *favouring* RCD include aetiologies or circumstances where restoring maternal circulation within approximately

2 to 3 min is doubtful. Resuscitation teams should consider early on whether the aetiology of the arrest is likely to be rapidly reversible. Such aetiologies may include hypoxia, electrically treatable cardiac arrhythmias, tension pneumothorax and certain metabolic disturbances such as hypoglycaemia or hyperkalaemia. The presence of rapidly

reversible causes may argue for keeping one's scalpel holstered; conversely, their absence suggests a need to prepare for likely RCD.

3. **'Whether' #2:** RCD tends to be more beneficial the later the gestational age. Beyond ~ 24 weeks' gestation (roughly the time when the uterine fundus starts to extend above the umbilicus), substantial aortocaval compression and foetal viability grant RCD a higher chance of saving lives than endangering them. A term foetus fully capable of surviving outside gains little from remaining inside an ischemic uterus. Earlier gestations, especially below 20 weeks, present a more difficult dilemma: uterine interference with maternal resuscitation is less pronounced, and the baby is less likely to survive extrauterine life, making RCD less favourable. Mothers carrying 13- to 15-week gestations have been successfully resuscitated without recourse to RCD, eventually delivering at term.⁸ Yet if unrecognized aortocaval compression or other pregnancy-related factors impede the mother's resuscitation in early pregnancy, not performing RCD may lead to the loss of both mother and baby, whereas performing it may save the mother's life while sacrificing that of the baby. Although there are no easy answers here, RCD may still be beneficial when no other prospect of reversing the arrest is apparent, to the extent that it may increase the chances of saving at least one life.
4. **'When':** The *less reversible* the aetiology and the *worse* the maternal prognosis, the *earlier* RCD should be done. Maternal and neonatal survival decline rapidly with ongoing ischaemic time,^{4,9} and initiation of resuscitative efforts may have already been delayed by several factors common to these scenarios (slow recognition, obstructed access to resuscitation equipment, absent vascular access, interfering patient clothing, etc.); consequently, by the time a physician arrives, the most appropriate time to begin considering RCD is likely 'immediately'. A 2015 AHA Scientific Statement⁸ advocates starting the procedure "after about 4 min" from either the onset of cardiac arrest or the start of resuscitative efforts, but emphasises that shorter arrest-to-delivery times are associated with better outcomes. No minimum waiting time is thus required: initiating RCD before the 4-min mark is often ap-

propriate, especially when faced with situations such as "prolonged pulselessness or nonsurvivable maternal trauma, in which maternal resuscitative efforts are obviously futile [...] *there is no reason to delay performing PMCD* (Class I, Level of Evidence C-Limited Data)".⁵ Moreover, the procedure itself can easily take more than a minute to perform.⁴ RCD should still be performed when indicated even if a longer-than-desirable time has elapsed, as foetal survival has been reported after ischaemic times of 10 or 15 min and longer with high-quality CPR; a defeatist attitude is not appropriate.⁴

5. **'Where':** RCD should be performed 'on the spot'. Moving the mother anywhere is likely to worsen maternal and neonatal outcomes by delaying the return of spontaneous circulation, according to an AHA recommendation (Class IIa, LOE B).⁸
6. **'How':** **Figures 1 and 2** suggest a way to position the team before and during RCD, respectively. The reader is also referred to excellent step-by-step descriptions in major emergency medicine textbooks and online.^{10,11} Equipment required is minimal and includes a #10 scalpel and umbilical cord clamp.

Other modifications

Vascular access should be established above the diaphragm to more effectively reach the heart. Endotracheal intubation should be performed by the most experienced provider available, as it may be more difficult in pregnant women.^{1,2,8,12} A mechanical device to provide chest compressions may spare limited human resources. Although cardiopulmonary bypass or extracorporeal oxygenation have been proposed,¹³ these therapies are unavailable in most settings.

Address 'human factors'

A physician urging RCD in a labour or emergency room may face strong opposition from other members of the healthcare team or the patient's family, for whom performing caesarean delivery in this location may (rightfully) seem brutal, unsterile and highly irregular. Yet because RCD may be vital to successful resuscitation, clinical teams need to prepare and train to mitigate the effect of 'human factors' such as hesitation and

fear as these critical events unfold. Achieving delivery within 5 min of an unexpected cardiac arrest is challenging; only 7% of cases reviewed succeeded.⁴ Designating a 'checklist reader' may help speed the team through the required actions.

Rehearse critical events

Resuscitation courses such as ALARM and ACLS and critical-event drills in Canadian hospitals should include 'maternal cardiac arrest events' in their curricula, providing opportunities to rehearse the many actions that need to happen promptly to optimise maternal and neonatal outcomes.

MANAGEMENT OF MATERNAL CARDIAC ARREST: CASE RESOLUTION

You confirm PEA and see no immediate response to left uterine displacement, effective oxygenation and epinephrine 1 mg given in an upper extremity vein. No toxic or traumatic causes are apparent. To mitigate some of the inevitable team hesitation and family distress, you announce, "There's been no pulse for 3 min. We need to do an emergency cesarean delivery right here and now. There's no time to move her anywhere. This is the best way to save the baby, and it could save the mother too. Please get me a #10 scalpel right now."

Chest compressions continue, and the uterus is kept displaced to the left of the great vessels by an assistant using a one-handed technique. A midline incision is made from xiphoid to pubis, the rectus muscles spread, peritoneum entered, and a vertical incision made in the uterus. A nurse, recalling her recent maternal cardiac arrest drill, retracts, evacuates amniotic fluid with suction, and calls an assistant to bring the department's maternal cardiac arrest box.

You lift the vertex cephalad while the nurse applies fundal pressure, delivering a live baby girl. She clamps and cuts the cord and hands the baby to her colleague. By this time, some oozing begins to appear in the previously bloodless surgical field, and the next rhythm check demonstrates a return of spontaneous circulation.

The abdomen is packed with moistened laparotomy sponges until a surgeon arrives. Inotropic and sedative infusions are started to optimise cardiac

output and patient comfort as post-resuscitation care continues; intensivist consultation is obtained. Broad-spectrum antibiotics are administered with the aim of preventing a subsequent surgical site infection. Uterotonics are given with due attention to their hemodynamic effects. You debrief the family and team their concerns. The mother and baby go on to make a full recovery from this suspected embolic event.

CONCLUSION

Cardiac arrest in pregnancy continues to challenge clinicians by unexpectedly presenting an extremely time-sensitive condition that immediately endangers two lives and may require bold interventions such as RCD to reverse it. Accumulating evidence supports the above modifications to maximise maternal and neonatal survival. Emphasising maternal cardiac arrest as a special topic in critical event drills and courses may optimise responses to this crisis and save lives. Mothers, babies and families struck by cardiac arrest deserve no less than our best and swiftest responses to this frightening but potentially rectifiable catastrophe.

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Detention of patients in rural hospitals: Can we hold the patient awaiting transfer to a psychiatric facility?

Christopher R. Foerster,
MD, MSc, CCFP^{1,2},
Monica Blichowski,
MD¹, Inderjeet Panesar,
MB, BCh, BAO³,
Kyle Carter, MD¹

¹Department of Family
Medicine, Schulich School
of Medicine, Western
University, ON, Canada,

²Department of Hospital
Medicine, Tillsonburg
District Memorial Hospital,
ON, Canada, ³Department
of Family Practice, Surrey
South Fraser, University
of British Columbia, BC,
Canada

Correspondence to:
Christopher R. Foerster,
christopher.foerster@tdmb.
on.ca

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reviewed.

INTRODUCTION

Physicians working in rural hospitals are frequently the frontline care providers for mental health in their communities. When a patient is deemed a risk to self or others, they require transfer to a psychiatric facility to be assessed by a psychiatrist. Unfortunately, those transfers may be delayed due to congested patient flow at accepted facilities or limiting transport factors, such as weather or resources.¹ There are misconceptions and areas of legal ambiguity around the legal mechanisms that allow for such patients to be detained in these situations. Understanding what the law currently allows for is important for family physicians to be able to appropriately inform patients of their rights, as well as to mitigate the medico-legal risk posed by these situations.

CASE REPORT

A 28-year-old female presented to a rural emergency department

following an intentional overdose of venlafaxine. The patient had a history of major depressive disorder and had presented during an acute situational crisis after having an argument with a family member. At the time of her presentation, the patient was deemed at risk to herself and the patient was placed on a Form 1 under Section 15(1) of Ontario's Mental Health Act (MHA)² by the emergency physician. She was admitted later that day to the intensive care unit for the management of her overdose and to await transfer to the Schedule 1 psychiatric facility. During her stay, the patient's most responsible physician completed two subsequent Form 1 documents, separated by 72 h, and after 7 days, the patient was accepted at a psychiatric facility outside of the associated referral hospital due to congestion at the designated psychiatric facility. The patient spent 7 days in the community hospital awaiting transfer.

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DISCUSSION

This case presents the challenging but not uncommon situation of a patient in a community hospital who meets Form 1 criteria to be transferred to a psychiatric facility for assessment but for whom transfer is delayed by the receiving facility. As described in the Ontario Hospital Association (OHA) publication 'A Practical Guide to Mental Health', the Form 1 allows for detention of patients in a psychiatric facility but does not give specific grounds for detaining patients in the community hospital.³ The guide clearly states that 'Public hospitals that are not designated psychiatric facilities do not have the authority to detain a person under the MHA'. Instead, the ability to detain a patient in a community hospital while awaiting transfer to the psychiatric facility comes from common law. This common law duty is further supported in the Health Care Consent Act (HCCA) that explicitly states that the HCCA 'does not affect the common law duty of a caregiver to restrain or confine a person when immediate action is necessary to prevent serious bodily harm to the person or to others'.⁴

Ontario is not unique in that the detention of patients in community hospitals for mental health reasons takes place under a common law duty rather than an explicit statute. A review of other provinces' MHAs, or equivalent legislation conducted for this case report, confirmed that all other provinces, with the exception of Quebec, rely on the common law duty for detention in community hospitals before transfer to a psychiatric hospital. Quebec's judicial system is regulated by the Civil Code of Quebec, but the detention in community hospitals ends up being similar to the common law duty of the other provinces.

Physicians practising in Canadian community hospitals are placed in a difficult position when psychiatric facilities are not immediately able to accept these patients. While there is no explicit limit on how long the common law duty can be used to detain a patient in Ontario, the OHA guide advises that it should be 'confined in time to the immediate emergency and that it cannot be extended indefinitely'. In addition, the MHA¹ dictates that the transfer from the community hospital to the psychiatric facility for someone placed on a Form 1 must happen 'forthwith',

which case law has suggested means 'as soon as reasonably possible'.³

It is important for community hospital physicians in this situation to understand that their ability to detain the patient in their facility comes from common law and not the MHA and that, therefore, the 72-h time limit for the assessment of a patient on a Form 1 does not apply. The Form 1 is not providing the grounds for holding the patient in the community hospital but is documenting the patient's need and requirements under the MHA for transfer to and assessment at a psychiatric facility. If the situation changes and the patient no longer meets the requirement for detention in the community hospital by common law, the physician has no legal authority to detain the patient.

Knowing that, in our current hospital environment, there will often be delays in psychiatric facilities accepting transfers from community hospitals, there should be legislative measures to dictate a formal mechanism under which patients who meet Form 1 criteria and common law duty can be held in community hospitals awaiting transfer. This would better protect the rights of patients by clarifying what their rights are to challenge their detention in the community hospitals and what physicians' obligations are in terms of on-going assessment and efforts to expedite transfer. Community hospitals should also consider engaging with their psychiatric referral centres about policies to expedite the transfer for these patients.

CONCLUSION

As things stand now, physicians who detain patients who have met criteria for a Form 1 in community hospitals must be aware that their ability to detain them is from common law and not the Form 1 itself. When situations arise where transfer is delayed, the sending physicians should engage with any available psychiatric facility and should carefully document their efforts to facilitate immediate transfer.

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Conflicts of interest: There are no conflicts of interest.

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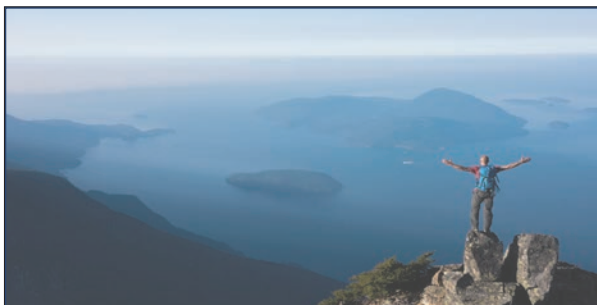
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The Weeneebayko ("Two Bays" - James Bay and Hudson's Bay) Area Health Authority (WAHA) provides all facets of medical care within 6 predominantly First Nation's communities along the west coast James Bay and Hudson's Bay. Population served—12,000



Moose Factory, Moosonee, Fort Albany,
Kashechewan, Attawapiskat and Peawanuck

**Position: Full-time permanent family practitioner
with ER/OB experience**

Weeneebayko Area Health Authority
19 Hospital Drive, P.O. Box 664,
Moose Factory, ON

For more information contact:
Jaime Kapashesit
Physician Services Coordinator
jaime.kapashesit@waha.ca
705 658-4544 ext. 2237

Skills Requirement: Must hold a medical degree and be
licensed or eligible for licensure through the College of
Physicians and Surgeons of Ontario

Language of work: English

Remuneration:

- Generous compensation package with yearly travel allowance and remote medicine funding bonuses
- Housing in Moose Factory provided with all amenities included

Job Duties

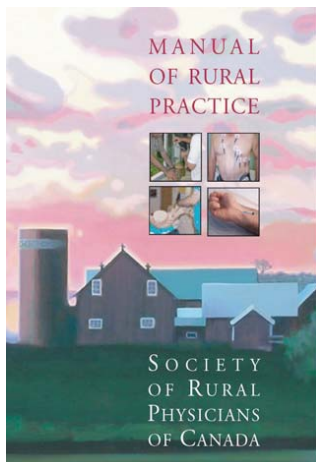
- Examine patients and take their histories, order laboratory tests, X-rays and other diagnostic procedures and consult with other medical practitioners to evaluate patients' physical and mental health
- Prescribe and administer medications and treatments
- Provide acute care management
- Advise patients on health care including health promotion, disease, illness and accident prevention
- Coordinate and manage primary care to remote First Nations communities
- Faculty appointment at Queen's, NOSM, U of T, U of O, with a well developed teaching practice program
- Become a member of a multidisciplinary team with full-time surgical and Anaesthesia

Manual of Rural Practice – The Second Printing

A text for all seasons

The Manual of Rural Practice is written for rural doctors, by rural doctors who understand the context of rural practice in which we are called upon to do a wide variety of procedures. These procedures can sometimes be lifesaving, and occasionally are required in stressful, difficult and isolated conditions. The Manual of Rural Practice provides clear practical directions for 40 rural practice procedures, ranging from rapid sequence intubation to ingrown toenail removal, with more than 320 illustrations. The articles are adapted in part from the "Occasional" series, published regularly in the Canadian Journal of Rural Medicine. The book is divided into 6 sections:

- Airway (e.g., management, laryngeal mask airway)
- Cardiac/Pulmonary (e.g., arterial lines, chest tube insertion, cardioversion)
- Nervous system (e.g., lumbar puncture, Bier block)



- Integument (e.g., extensor tendon repair, fishhook removal, breast cyst aspiration)

- Musculoskeletal (e.g., Colles' fracture, casting, knee aspiration)
- Genitourinary/Maternity (e.g., shoulder dystocia, suprapubic catheterization)

The format for each procedure is quick and easy to grasp, starting with an equipment list, step-by-step instructions and ending with a procedure summary. The text is clearly written, and the illustrations are helpful.

This book is especially recommended for both practising rural doctors and rural doctors in training. Every rural hospital and training program should make a copy easily accessible. Rural doctors will also find the equipment lists (there is even an appendix that details part numbers and suppliers) valuable in ensuring that their hospital and clinic procedure rooms have

the required equipment readily available when needed.

Edited by P. Hutten-Czapski, G. Magee and J. Wootton. November 2006. Society of Rural Physicians of Canada. Hardcover, 280 pp. Illust. ISBN 10: 0-9781620-0-5.

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- Vacuum mid pelvis rotations
- Bring Your OR Nurse
- Surgical First Response to Trama

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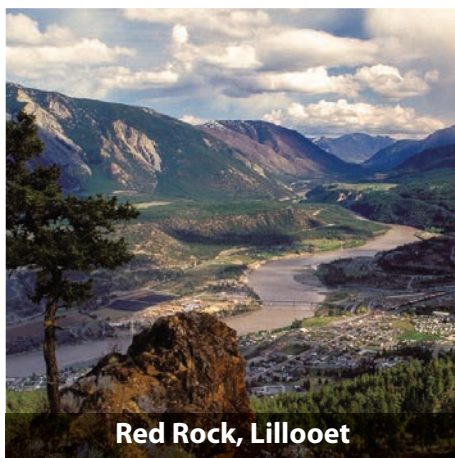


Biking in Elk Valley, Sparwood

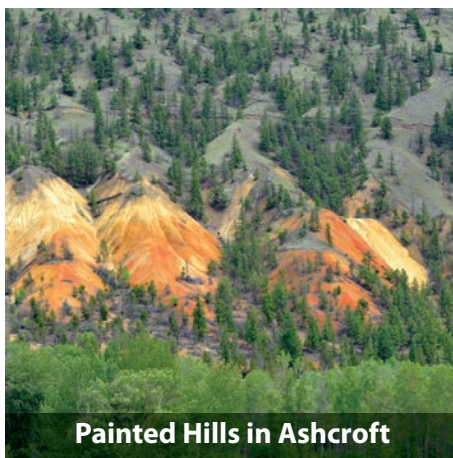


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