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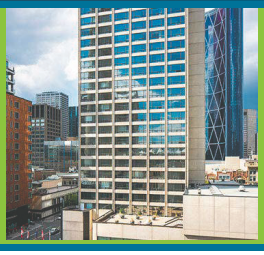
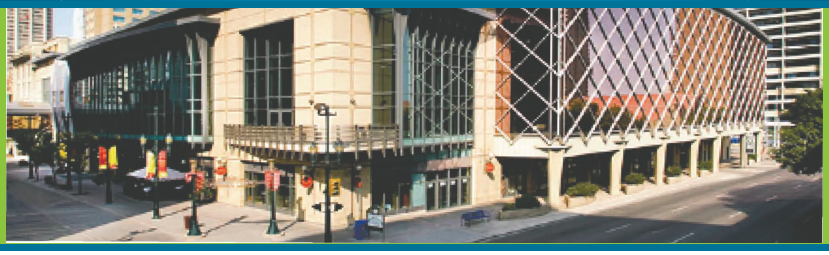


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EDITORIALS / ÉDITORIAUX

ORIGINAL ARTICLES / ARTICLES ORIGINAUX

THE PRACTITIONER / LE PRATICIEN

LETTERS / CORRESPONDANCE

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Watercolour/aquarelle, 14"×20", by Helmut Langeder, SCA, IAF, LAA
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www.helmutlangeder.com
Helmut Langeder has been painting in oils and watercolours for many years. When conditions allow he loves to paint outdoors, plein air. He is known for his luminous landscapes and city scenes, mostly in the province of Quebec, but his work can be seen nationally.

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SAVE THE DATE

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Recruitment: a perennial question

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I have been a rural generalist physician for decades, and the interest in recruitment is no less today than when I entered practice. This issue of the *CJRM* is dedicated to the topic, and no wonder. In 2015, only 8% of physicians were practising in rural regions of Canada, where 18% of the population live.[1]

A decade earlier, 10% of physicians practised rurally.[2] Why are we failing to meet the needs of some of the most disadvantaged populations in our country?

Some of the problems are identified in Mathews, Ryan and Samarasena's study of Memorial University of Newfoundland (MUN) medical graduates published in this issue (page 54). Despite having above-average results for Canadian medical schools, MUN's rural output has decreased, from 14% for 1989–1998 graduates to 9% for 1999–2008 graduates. Not surprisingly, specialty training was negatively associated with rural practice, and having a rural background was found to be positively related to rural practice. However, it cannot be just about recruiting students of rural origin, because even in Newfoundland and Labrador most students with a rural background end up practising in urban areas. One new finding was that rural family medicine training (at MUN) was associated with rural practice. We need to have family practice residents train close to where society needs them to work.

Witt's work in Manitoba (page 43) delves into the issues of incentives. We know that rural income is an attraction that counterbalances the workload expectations. Witt used the discrete choice experiment approach to value some stressors of rural practice. An additional hour of work was valued at $183. More can be done with this technique in describing the value of the burdens of rural medical work.

A group of medical students from Western University, Robinson and colleagues, publish in this issue (page 62) a paper on a medical school outreach and mentorship program for rural secondary school students. It is a little early to say whether the pilot program they describe will increase enrolment of rural students in medical school, much less increase output of rural practitioners at the Schulich School of Medicine and Dentistry. However, it is not too early to support such experiments in doing something at the medical school level to meet society's needs.

There is a lot more to be done for rural medicine. We need to determine why the bright lights of the city attract students of rural origin. We need to know the psychological causes for urban students to go against the grain and choose rural practice. We need to better understand why some universities are better at producing rural-practising graduates than others.

Finally, we need, like the medical students from Western, to act on it.

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Le recrutement : l'éternelle question

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J'exerce comme généraliste en milieu rural depuis des décennies et mon intérêt pour le recrutement est aussi grand que le jour où j'ai entamé ma pratique. Ce numéro du *JCMR* est consacré à la question et cela n'a rien d'étonnant. En 2015, 8 % seulement des médecins exerçaient en milieu rural, où 18 % de la population habite[1].

Dix ans auparavant, le nombre de médecins exerçant en milieu rural était de 10 %[2]. Pourquoi ne réussissons-nous pas à répondre aux besoins des populations comptant parmi les plus défavorisées de notre pays?

L'étude de Mathews, Ryan et Samarasena sur les diplômés en médecine de l'Université Memorial de Terre-Neuve (MUN), publiée dans ce numéro (page 54), met en relief un certain nombre de problèmes. Malgré des résultats supérieurs à la moyenne pour les facultés de médecine au Canada, le nombre de diplômés en médecine de MUN exerçant en région rurale est passé de 14 % pour les diplômés de 1989–1998 à 9 % pour les diplômés de 1999–2008. Sans surprise, la formation spécialisée est associée de façon négative à la pratique en milieu rural et le fait de venir d'un milieu rural y est associé de façon positive. Or, la solution ne peut venir que du recrutement d'étudiants de milieux ruraux car, même à Terre-Neuve-et-Labrador, la plupart des étudiants venant de milieux ruraux finissent par exercer en milieu urbain. Une nouvelle constatation a cependant été dégagée, soit le lien entre la formation en médecine familiale rurale (à MUN) et la pratique en milieu rural. Nous devons veiller à ce que les résidents en médecine familiale obtiennent leur formation plus près des milieux où la société a besoin d'eux.

Le travail de Witt au Manitoba (page 43) examine la question des mesures incitatives. Nous savons que la rémunération en milieu rural est un attrait qui contrebalance les attentes au niveau de la charge de travail. Witt utilise la méthode des choix discrets pour déterminer la valeur de certains facteurs de stress de la pratique en milieu rural. Une heure supplémentaire de travail était évaluée à 183 $. On peut recourir davantage à cette technique pour décrire la valeur du fardeau de la pratique en milieu rural.

Un groupe d'étudiants en médecine de l'Université Western, Robinson et ses collègues, publie dans ce numéro (page 62) un article sur un programme de mentorat et de rayonnement dans les écoles secondaires rurales. Il est un peu trop tôt pour savoir si le programme pilote qu'ils décrivent fera augmenter l'inscription des élèves de milieux ruraux dans les écoles de médecine et encore moins s'il fera augmenter le nombre de praticiens ruraux produits par l'École de médecine et de dentisterie Schulich. Ceci dit, il n'est pas trop tôt pour appuyer ce type d'expériences au niveau des écoles de médecine afin de répondre aux besoins de la société.

Il reste encore beaucoup à faire pour les milieux ruraux. Nous devons tenter de savoir pourquoi la vie trépidante des grandes villes attire les étudiants originaires de milieux ruraux. Nous devons comprendre les facteurs psychologiques qui incitent des étudiants de milieux urbains à aller à contre-courant et à choisir d'exercer en milieu rural. Nous devons chercher à mieux comprendre pourquoi certaines universités réussissent mieux que d'autres à produire des diplômés qui choisissent d'exercer en milieu rural.

Et enfin, nous devons, à l'instar des étudiants en médecine de l'Université Western, prendre des mesures en conséquence.

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President's message. It is a political world

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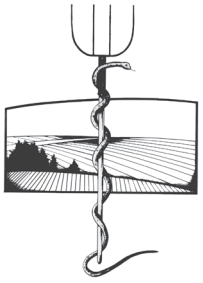
It has become a political world. Much more now than I remember in the days of my youth. As I write this, south of our border, the president is complaining that even American judges base their decisions not on what is right but, rather, what best suits their political leanings. This from a man who wants only judges who share his opinion of what is right.

Health care as well has become even more of a political football. The recent discussions between the provinces and the federal government are a case in point. It is no longer left to the provinces to decide where the health care funds should be spent; rather, rightly or wrongly, the federal ministry directs where the provinces' share is directed. Strings attached!

In our own world of rural medicine, politics is increasing in prominence. The privileging issue in British Columbia, the recent dispute between the government and physicians in Ontario, an increasing pressure to use "specialist" services, a belief that care is better in the big centres and, sadly, a fading interest among our urban colleagues in providing comprehensive care are cases in point. We need a loud voice to defend generalism and rural health care!

The SRPC stands alone in this niche. From its humble origins 25 years ago, it has become a nationally recognized and respected organization, but when you look at the membership roll, our numbers are meager — not quite 1200 active members at last count (not including 2600 students/residents).

We need to build our membership. I urge each of us to encourage colleagues to take up membership and enhance our influence. Judges must resist political influence, but it is time for rural docs to use theirs.



Message du président. Nous vivons dans un monde politisé

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Notre monde s'est politisé. Et il est beaucoup plus politisé qu'il ne l'était dans ma jeunesse. Au moment d'écrire ces lignes, au sud de notre frontière, le président se plaint que même les juges américains prennent leurs décisions non pas en fonction de ce qui est bien, mais de ce qui convient le mieux à leur position politique. Et ceci de la part d'un homme qui ne veut que des juges qui définissent le bien de la même façon que lui.

Les soins de santé sont également devenus un ballon politique. Les discussions récentes entre les provinces et le gouvernement fédéral le montrent bien. On ne laisse plus les provinces choisir où elles veulent dépenser les fonds en soins de santé. C'est plutôt le ministère fédéral, à tort ou à raison, qui décide inconditionnellement du secteur d'attribution de la part de la province!

La politique commence à prendre une place de plus en plus importante même dans notre propre monde de la médecine rurale. La question des privilèges en Colombie-Britannique, le récent conflit entre le gouvernement et les médecins en Ontario, les pressions accrues pour l'utilisation des services des « spécialistes », la croyance voulant que les soins soient meilleurs dans les grands centres urbains et, hélas, une baisse d'intérêt parmi nos collègues urbains pour la prestation de soins intégrés en sont autant d'exemples. Nous avons besoin d'une voix forte pour défendre le généralisme et les soins de santé en milieu rural!

La Société de la médecine rurale du Canada fait bande à part dans ce créneau. De ses origines modestes, il y a 25 ans, la Société est devenue un organisme respecté et reconnu à l'échelle nationale. Or, ses membres sont peu nombreux et n'atteignaient au dernier dénombrement que 1200 membres actifs (excluant 2600 étudiants et résidents).

Nous devons grossir les rangs de la Société. J'exhorte chacun à encourager nos collègues à adhérer et à accroître notre influence. Les juges doivent résister à l'influence politique, mais le moment est venu pour les médecins en milieu rural d'utiliser le leur.

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Original Article
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Physician recruitment and retention in Manitoba: results from a survey of physicians' preferences for rural jobs

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This article has been peer reviewed.

Introduction: Rural recruitment and retention continues to present challenges to health workforce planners. This paper reports and analyzes the results of a survey sent to physicians in Manitoba, eliciting their opinions regarding rural jobs.
Methods: A survey was sent to all physicians in Manitoba. Part 1 of the survey included questions about background and demographic information; part 2 was a set of job satisfaction questions regarding respondents' current job; and part 3 included 2 sets of stated-choice questions eliciting preferences for a set of attributes relevant to rural recruitment and retention.
Results: Of the 2487 physicians who received surveys, 561 (22.6%) responded. Respondents indicated that income, hours worked and on-call frequency are very important: overall job satisfaction increased with income and decreased with hours worked. Income, hours and on-call frequency were ranked "very important" by the largest proportions of physicians. The estimated compensation for on-call more frequent than 1-in-4 was very high (82% of average income), and additional hours worked were worth $183 per hour. Other attributes that were important included professional interaction, housing availability and community incentives during the first year, which were valued at 11%–31% of annual income.
Conclusion: Work–life balance is a key consideration for rural jobs, and there are incentives that can compensate for less desirable attributes.

Introduction : Le recrutement et le maintien en poste continuent d'être une source de défis pour les planificateurs des ressources humaines en santé. Cet article présente et analyse les résultats d'un sondage sur le travail en milieu rural mené auprès de médecins au Manitoba.
Méthodes : Un questionnaire a été envoyé à tous les médecins au Manitoba. La partie 1 du questionnaire recueillait des renseignements démographiques et généraux; la partie 2 présentait un ensemble de questions sur la satisfaction professionnelle des répondants à l'égard de l'emploi actuel; la partie 3 contenait 2 séries de questions à choix fixes pour déterminer les préférences en regard d'aspects pertinents au recrutement et au maintien en poste en milieu rural.
Résultats : Sur les 2487 médecins ayant reçu le questionnaire, 561 (22,6 %) ont répondu. Les répondants ont indiqué que le revenu, les heures de travail et la fréquence du service de garde sont très importants : le taux de satisfaction générale augmentait en fonction du revenu et diminuait selon le nombre d'heures de travail. Le revenu, les heures de travail et la fréquence du service de garde étaient considérés comme étant « très importants » par le nombre le plus élevé de médecins. La rémunération estimée pour un service de garde de fréquence supérieure à un rapport d'un sur quatre était très élevée (82 % du revenu moyen), et la valeur accordée à chaque heure supplémentaire était de 183 $ l'heure. Parmi les autres aspects jugés importants, mentionnons l'interaction professionnelle, la disponibilité de logements et des mesures incitatives communautaires la première année, le tout évalué à 11 %–31 % du revenu annuel.
Conclusion : L'équilibre entre le travail et la vie personnelle est un facteur clé pour les emplois en milieu rural et il existe des mesures incitatives pour compenser les caractéristiques moins désirables.

INTRODUCTION

The physician-to-population ratio in Canada has been well below the Organisation for Economic Co-operation and Development average for many years.[1] A recent report by the Canadian Institute for Health Information, however, suggests that this ratio is increasing, as the number of physicians is growing faster than the population.[2] These statistics appear promising yet hide important regional disparities: in 2014, Manitoba, Nova Scotia and Prince Edward Island were the only provinces where the physician-to-population ratio was not the highest ever recorded.[3] Since 2010, the total number of doctors in Manitoba has increased by 12.2% while the national average was 14.6%.[4] Rural areas generally have fewer physicians relative to the proportion of population living there than urban areas, and this is true across Canada.[4] Manitoba has the highest outmigration of doctors, speculated to be caused in part by the high number of foreign-trained physicians: in 2014, 34.3% of all physicians and 48.5% of family physicians in the province were foreign-trained, compared to the national averages of 25.4% and 28.3%, respectively.[4] The problem is more acute across Manitoba's Regional Health Authorities: in the Winnipeg Regional Health Authority, 40.4% of family physicians were foreign-trained, whereas 83.9% were foreign-trained in the Northern Regional Health Authority.[4] Similar differences were present in other provinces.[4]

Recruitment and retention, particularly to rural, underserviced areas, has long been a policy goal of the government of Manitoba and of all other provincial and territorial governments in Canada. In Manitoba, incentives to support recruitment to these areas include return-of-service grants, financial incentives to recruit workers and a commitment to new technologies to expand expertise.[5]

There is a sizeable literature on reasons why physicians leave rural areas, including intense workloads,[6] difficulty taking time off,[7] professional isolation,[8] lack of specialized education[9] and lack of professional support.[10,11] However, practising in rural areas also has advantages: a greater variety of work,[12,13] more continuity of care[8] and community characteristics, such as welcoming employers, peer support and outdoor recreation[14–17] are appealing. Many of the reasons physicians cite for wanting or not wanting to work in rural areas are nonpecuniary, yet financial incentives continue to be key strategies for improving rural recruitment and retention.

Financial incentives can help recruit physicians to rural areas, but they do little to retain them.[18] Nonpecuniary incentives (e.g., programs that support medical practice) to improve recruitment and retention are being used more frequently,[19] but there is no clear evidence to show what type of and how much nonpecuniary compensation is necessary to balance undesirable job characteristics.

The aim of the present study was to assess the financial value and the importance overall and relative to each other of pecuniary and nonpecuniary factors that are known to affect recruitment and retention. Trade-offs between desirable and undesirable job attributes are possible to reduce recruitment problems and attrition. This link between the literature, which documents mostly nonpecuniary reasons for rural recruitment and retention problems,[6,7] and policies and incentives to attract physicians to rural areas (some of which are financial[20]) has been largely missing so far. However, it is key to designing more successful job packages and incentives to attract physicians to rural areas and retain them. As an example, it is well known that physicians prefer less frequent on-call, but it is not clear from the literature how physicians should be compensated for providing additional on-call services and at which level of frequency they need additional compensation. Furthermore, compensation can be pecuniary or nonpecuniary; financial incentives have not been very successful,[16,21] and to use nonpecuniary compensation requires information on what job attributes such as on-call are worth, both in monetary value and in terms of nonpecuniary incentives. The purpose of this study was to collect information about the value of and preferences for different types of incentives.

METHODS

A questionnaire was sent to all physicians in Manitoba who were listed on the College of Physicians and Surgeons of Manitoba's physician directory[22] in December 2012. A hard-copy survey together with instructions for completing the survey online and a stamped return envelope were mailed out by first-class post. A reminder postcard with the online log-in information was sent to all who had not replied 3 weeks after the initial mail-out. The survey was sent to all physicians in Manitoba in order to achieve an adequate sample size to conduct the analyses.

The survey consisted of 3 main sections: 1) questions about physicians' current job, background and

sociodemographic information, 2) a section on job satisfaction and 3) 2 sets of questions about preferences for rural jobs. Questions on job satisfaction were scored on a 5-point Likert scale ranging from "very dissatisfied" to "very satisfied." A "not applicable" option was included for each item. The third section consisted of a discrete choice experiment (DCE)[23] and a simple ranking exercise using the same set of attributes included in the DCE.

In the DCE, respondents were presented with 9 choice pairs in the questionnaire (see Figure 1 for example). Respondents made 2 choices for each pair: between job A and job B, and among job A, job B and their current job. The second question makes the DCE more realistic since respondents may, in reality, choose neither job. The attributes for the DCE were chosen in focus group discussions with physicians and policy-makers familiar with rural practice and were deemed important and feasible.

Attribute levels were chosen based on the same criteria and in the context of what is appropriate and possible for jobs in rural Manitoba. In addition, a "location" attribute was included as a measure of the degree of rurality, and the attribute levels were constructed to facilitate classification of all communities in Manitoba, except Winnipeg and Brandon, into 4 groups (population < 5000 and ≤ 3-hr drive from Winnipeg; population < 5000 and > 3-hr drive from Winnipeg; population 5000–15 000 and ≤ 3-hr drive from Winnipeg; population 5000–15 000 and > 3-hr drive from Winnipeg). According to the 2011 census,[24] there were 261 communities in Manitoba with a population less than 5000, of which 123 are more than a 3-hour drive from Winnipeg (calculated using Google Maps). There were 22 communities with a population of 5000–15 000, of which 4 are more than a 3-hour drive from Winnipeg. Three of these 4 communities (Thompson, The Pas and Flin Flon) are in northern Manitoba. Attribute levels for Winnipeg and Brandon were deliberately excluded to avoid respondents' choosing jobs based on a strong preference for an urban location. Attributes and levels are listed in Appendix 1. A D-efficient design was used to generate the DCE using SAS software,[25] with 36 choice pairs blocked into 4 sets of questions.

The DCE was followed by a question asking respondents to rank each attribute in terms of importance for rural recruitment and retention. In particular, for 9 of the 10 attributes included in the DCE, respondents were asked to indicate whether they thought it was "very important," "somewhat important" or "not important." The attribute "location" was not included since this was not an amendable incentive.

Statistical analysis

The DCE data were analyzed with the use of NLOGIT software; all other analyses were done with the use of Stata 13. The main results for the DCE were generated using all responses, and robustness checks were done using 2 subsamples. The first subsample included only specialists likely to be found in rural and remote areas (general practitioners, internists, general surgeons, pediatricians,

Attribute	Job A	Job B
Income (gross, annual)	$250 000	$300 000
Hours worked per week	55 hours	45 hours
Spouse finding work	Acceptable opportunities	Acceptable opportunities
On-call activity	Once every 6 days	Once every 8 days
Type of practice	Solo	Group
Additional rural training	None	Periodic sessions
Community-sponsored incentives	None offered	Provided continuously while working in the community
Housing availability	Adequate selection	Limited selection
Clinic technology	Electronic medical record	Electronic medical record
Location	Rural, population 5000–15 000; more than 3-hr drive to Winnipeg	Rural, population < 5000; more than 3-hr drive to Winnipeg

1. Which job do you prefer? Job A ☐ Job B ☐

2. Which job would you choose? Job A ☐ Job B ☐ My current job ☐

Fig. 1. Example of a discrete choice experiment question.

obstetrician/gynecologists, anesthesiologists and psychiatrists), to ensure that the results were not affected by preferences of specialists unlikely to even consider rural locations. The second subsample included only physicians with a Canadian undergraduate degree, omitting international medical graduates. The complement to this latter analysis, international medical graduates only, had too few observations, and so conjectures about preferences of these physicians can be made only by comparing the difference in results for Canadian-trained physicians (subsample 2) to all physicians (main results) and attributing these to the preferences of international medical graduates.

Table 1: Respondent characteristics

Characteristic	No. (%) of respondents*
Physician type	
General practitioner/family physician	246 (45.3)
Specialist	297 (54.7)
Sex	
Female	179 (33.1)
Male	362 (66.9)
Age, yr	
< 45	202 (37.8)
45–64	270 (50.6)
> 64	62 (11.6)
Undergraduate degree completed in Canada	
Yes	381 (70.5)
No	159 (29.5)
First postgraduate degree completed in Canada	
Yes	392 (72.8)
No	146 (27.8)
Most recent postgraduate degree completed in Canada	
Yes	275 (77.7)
No	79 (22.3)
Gross annual income, $	
≤ 275 000	165 (30.8)
275 001–325 000	90 (16.8)
325 001–375 000	65 (12.2)
375 001–425 000	66 (12.3)
425 001–475 000	40 (7.5)
> 475 000	109 (20.4)

*Sample size varies since not all respondents answered all questions.

Ethics approval

Ethics approval was obtained from the University of Manitoba's Research Ethics Board.

RESULTS

The survey was completed by 561 (22.6%) of 2487 physicians; 552 answered at least some of the questions regarding job satisfaction and stated preferences. A total of 112 respondents (20.0%) completed the survey online. This yielded about 4300 usable responses to the DCE questions. Table 1 presents an overview of the respondents' characteristics.

Table 2 shows where the respondents lived and worked, from their survey responses. Physicians who worked in Winnipeg or in a small community near Winnipeg were underrepresented in the survey, and physicians who worked in Brandon, in a medium-sized community or in a small community far from Winnipeg were overrepresented compared with the Manitoba physician population.[23] There is also evidence that a small proportion of physicians commuted.

The imputed average hourly wage for the sample was $134, which was calculated from the income categories and the reported number of hours worked.

Of the 530 respondents who answered the return-of-service and intention-to-leave questions, 77 (14.5%) had completed a return-of-service

Table 2: Location of respondents

Location	No. (%) of respondents*		Work location of all Manitoba physicians†
	Work	Home	
Winnipeg	347 (64.0)	368 (68.2)	1865 (75.0)
Brandon	41 (7.6)	42 (7.8)	127 (5.1)
Town with population 5000–15 000			
≤ 3-hr drive to Winnipeg	67 (12.4)	51 (9.4)	157 (6.3)
> 3-hr drive to Winnipeg	33 (6.1)	26 (4.8)	97 (3.9)
Town with population < 5000			
≤ 3-hr drive to Winnipeg	33 (6.1)	38 (7.0)	164 (6.6)
> 3-hr drive to Winnipeg	21 (3.9)	15 (2.8)	77 (3.1)

*Sample size varies since not all respondents answered all questions.
†As per College of Physicians and Surgeons of Manitoba physician directory.[22]

agreement, and 152 (28.7%) planned to leave their job in the next 5 years (Table 3).

Responses to questions about spousal employment are shown in Table 4.

Job satisfaction

Proportionally, physicians were most dissatisfied with after-hours work, rural training, community incentives and clinic technology (Table 5). They were most satisfied with practice type, location, housing availability and cost of living.

Table 6 shows the Kendall τ-b correlation[26] between overall job satisfaction and the other job satisfaction questions, in decreasing order of correlation. The correlation was highest between overall job satisfaction and work–life balance; that is, respondents tended to rate their overall job satisfaction highly if they also rated their satisfaction with their work–life balance highly.

The job satisfaction responses were further analyzed by means of an ordered logit regression to investigate which variables significantly affected each response item (Table 7). Generally, the better the attribute level of the respondent's current job, the higher his or her level of satisfaction. This was also the case for the results of the remaining items not shown in the table. Two separate regressions for location were run, one that included housing availability, the other without (location I and II, respectively), and these suggest that satisfaction with location is related to amenities (adequate housing) rather than geographic location, since the location variables are significant (at 10%) only when housing is not included.

Table 3: Return-of-service agreement and intentions regarding leaving job

Variable	No. (%) of respondents*
Completed return-of-service agreement	
All	77 (14.5)
And planning to leave job	16 (20.7)
And completed undergraduate degree in Canada	47 (61.0)
And completed undergraduate degree outside Canada	30 (39.0)
Planning to leave job in next 5 yr	
All	152 (28.7)
And born before 1952	48 (31.6)
And outside Winnipeg and Brandon	54 (35.5)
And living in town < 5000 population	21 (13.8)

*Sample size varies since not all respondents answered all questions.

Table 4: Spousal employment and employment opportunities

Variable	No. (%) of respondents*
Spouse employed	320 (65.5)
And living in Winnipeg or Brandon	252 (78.8)
Spouse not employed	168 (34.4)
And looking for employment	30 (19.4)
No job opportunities for spouse looking for employment	21 (70.0)

*Sample size varies since not all respondents answered all questions.

Table 5: Job satisfaction

	Response; no. (%) of respondents				
Attribute	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
Overall job satisfaction	121 (22.2)	**309 (56.6)**	82 (15.0)	31 (5.7)	3 (0.6)
After-hours work	66 (12.7)	218 (41.8)	102 (19.6)	**101 (19.4)**	34 (6.5)
On-call	79 (16.2)	217 (44.5)	100 (20.5)	71 (14.6)	21 (4.3)
Support staff	87 (16.2)	267 (49.7)	88 (16.4)	73 (13.6)	22 (4.1)
Practice type	**181 (34.3)**	**291 (55.1)**	45 (8.5)	9 (1.7)	2 (0.4)
Hours worked	89 (16.3)	265 (48.6)	91 (16.7)	86 (15.8)	14 (2.6)
Income earned	136 (24.9)	274 (50.2)	84 (15.4)	48 (8.8)	4 (0.7)
Continuing medical education opportunities	117 (21.4)	277 (50.6)	80 (14.6)	57 (10.4)	16 (2.9)
Rural training	17 (5.7)	68 (22.7)	**135 (45.2)**	**54 (18.1)**	**25 (8.4)**
Clinic technology	86 (16.4)	218 (41.7)	101 (19.3)	81 (15.5)	**37 (7.1)**
Location	**181 (33.2)**	272 (49.9)	64 (11.7)	22 (4.0)	6 (1.1)
Work–life balance	78 (14.3)	222 (40.8)	126 (23.2)	93 (17.1)	25 (4.6)
Ability to take time off	117 (21.4)	249 (45.5)	95 (17.4)	64 (11.7)	22 (4.0)
Housing availability	**167 (33.3)**	260 (51.8)	51 (10.2)	20 (4.0)	4 (0.8)
Cost of living	146 (27.5)	**286 (53.9)**	64 (12.1)	29 (5.5)	6 (1.1)
Community incentives	20 (6.5)	82 (26.5)	**133 (42.9)**	**53 (17.1)**	22 (7.1)
Spousal employment opportunities	85 (19.7)	192 (44.6)	87 (20.2)	48 (11.1)	19 (4.4)

Attribute importance

The attributes ranked by most respondents as "very important" were on-call, income and hours worked (Table 8). The attributes ranked as "not important" by the largest proportion of respondents were community incentives, rural training and clinic technology.

Table 6: Kendall τ-b correlation between overall job satisfaction and the other job satisfaction measures

Measure of satisfaction	τ-b
Overall	1.0000
Work–life balance	0.5338
Hours worked	0.4826
Practice type	0.4467
Ability to take time off	0.4123
After-hours work	0.3936
Income	0.3859
Housing availability	0.3780
Cost of living	0.3615
On-call	0.3284
Continuing medical education	0.3271
Location	0.3054
Support staff	0.2982
Rural training	0.2663
Community incentives	0.2629
Clinic technology	0.2498
Spousal employment opportunities	0.2450

Discrete choice experiment

The DCE results reported here use data from the first question (the choice between job A and job B). A total of 82.4% of responses to the second question (job A, job B or current job) are for "current job," and 65% of respondents always chose "current job" for this question. The regression results from the mixed logit model[27] are shown in Table 9.

Rural training and spousal employment opportunities were not significant in the model. A 1-in-3 on-call ratio was not significantly different from a 1-in-2 ratio, although ratios less frequent than these were clearly preferred to a 1-in-2 ratio. The income coefficient does not have a standard deviation since it was specified to be a fixed variable, which is necessary for the willingness-to-pay calculations.[28]

Results of the rural specialties subsample were basically the same as the main results that included all specialties. The only difference in the subsample was that a 1-in-6 on-call ratio was not significantly different from a 1-in-2 on-call ratio. However, respondents in this subsample also clearly preferred less on-call to more, and so the insignificance of the 1-in-6 ratio is likely due to reduced sample size. Results for respondents with a Canadian undergraduate degree were also mostly the same as the results for the entire sample, with 2 exceptions. First, those with a Canadian undergraduate degree

Table 7: Ordered logit regressions with dependent variable "job satisfaction"

		Job satisfaction			
Attribute (base category)*	Level	Overall	On-call	Location I	Location II
Income		3.6×10^{-7}§	-1.2×10^{-7}	0.5×10^{-7}	0.8×10^{-7}
Hours		–0.2341§	–0.0153‡	–0.0133†	–0.0128†
Spousal employment opportunities (no)		0.3223	–0.0340	0.4330‡	0.5330‡
On-call		–0.0009	0.0212§	0.0022	0.0028
Rural training (none)		0.6258‡	0.0125	0.2386	0.2248
Housing availability (poor)	Adequate	0.0595	–0.2331	0.2932	
	Good	0.4762	0.1809	1.1652‡	
Location (small, far)	City	–0.0469	0.2087	0.5887	0.9794†
	Medium, close	–0.2636	–0.0672	0.7277	0.9882†
	Medium, far	–0.6120	–0.1084	–0.6060	–0.6494
	Small, close	–0.1156	–0.0472	0.3881	0.6110
Sex (male)		0.1944	–0.1564	0.4817‡	0.5613§
Age		0.0179†	–0.0068	0.0133	0.0156†
No. of observations		479	425	479	479
Pseudo-R^2		0.0517	0.0705	0.0689	0.0578

*Other covariates included practice type, community incentives, clinic technology, having children, being married and physician type; all were nonsignificant in these regressions.
†$0.05 < p \leq 0.10$.
‡$0.01 < p \leq 0.05$.
§$p \leq 0.01$.

significantly preferred "acceptable" employment opportunities for their spouse to "limited" or "some" opportunities. Second, they preferred small (population < 5000) towns within a 3-hour drive to Winnipeg to small towns more than a 3-hour drive to Winnipeg, whereas in the main results there was no significant difference between these. Hence, international medical graduates are likely to generally prefer larger towns to smaller ones, no matter how close the small towns are to the city.

Table 8: Ranking of attributes by respondents

	Ranking; no. (%) of respondents		
Attribute	Very important	Somewhat important	Not important
Income	**415 (78.6)**	109 (20.6)	4 (0.8)
Hours worked	**405 (78.3)**	104 (20.1)	8 (1.6)
Spousal employment opportunities	219 (44.6)	**241 (49.1)**	31 (6.3)
On-call	**443 (85.4)**	72 (13.9)	4 (0.8)
Type of practice	**272 (56.3)**	193 (40.0)	18 (3.7)
Rural training	104 (24.2)	**278 (64.6)**	48 (11.2)
Community incentives	96 (21.4)	**299 (66.6)**	54 (12.0)
Housing availability	**249 (51.6)**	217 (44.9)	17 (3.5)
Clinic technology	145 (32.5)	**257 (57.6)**	44 (9.9)

Table 9: Regression results from mixed logit model

Attribute (base category)	Level	Mean ± SD
Income		9.85×10^{-6}*§
Hours		–0.0956§ ± 0.0456§
Spousal employment opportunities (limited)	Acceptable	0.1453 ± 0.4996§
	Some	0.0277 ± 0.0656
On-call ratio (1-in-2)	1-in-8	0.9794§ ± 1.2037§
	1-in-6	0.3968‡ ± 0.4335†
	1-in-5	0.3955§ ± 0.5117§
	1-in-4	0.4133§ ± 0.5763§
	1-in-3	–0.1310 ± 0.2232
Practice type (hospital-based)	Interprofessional	0.0218 ± 0.4143§
	Group	0.5253§ ± 0.3565‡
	Solo	–0.6258§ ± 0.3098
Rural training (none)	Periodic	0.0792 ± 0.0633
	One-time	–0.0352 ± 0.1597
Community incentives (none)	Continuously	–0.0055 ± 0.3447‡
	During first year	0.2080‡ ± 0.2282‡
Housing availability (poor)	Adequate	0.3110‡ ± 0.3572§
	Limited	0.0435 ± 0.0279
Clinic technology (no technology)	Electronic medical record and telehealth	0.2497§ ± 0.2112
	Electronic medical record	0.1054 ± 0.3849§
Location (population < 5000, > 3-hr drive to Winnipeg)	Population 5000–15 000, ≤ 3-hr drive to Winnipeg	0.5301§ ± 0.1643
	Population 5000–15 000, > 3-hr drive to Winnipeg	–0.2825§ ± 0.0144
	Population < 5000, ≤ 3-hr drive to Winnipeg	0.0392 ± 0.2581
Constant		–0.0175

SD = standard deviation.
*The income coefficient does not have an SD since it was specified to be a fixed variable, which is necessary for the willingness-to-pay calculations.[28]
†$0.05 < p \leq 0.10$.
‡$p \leq 0.01$.
§$0.01 < p \leq 0.05$.
Number of observations = 4169, Akaike information criterion = 4783.5, Bayesian information criterion = 5074.9, pseudo-$R^2 = 0.1882$.
Levels are effects coded, so the base-case coefficient is the negative sum of the included levels.[30]

Table 10 shows willingness to pay to avoid moving from a better level to a less desirable level. Willingness to pay was calculated from the coefficients of the mixed logit model and is interpreted as the amount of annual income that physicians would need to be given in order to compensate them for a move to less desirable levels. Variables that were not statistically significant are not included in Table 10.

The results show that, for example, a physician would be willing to give up $308 000 in annual income to avoid moving from a 1-in-8 on-call ratio to a 1-in-2 on-call ratio, all else being equal. The income range in the DCE was $250 000 to $500 000, so the average income was $375 000. Hence, $308 000 corresponds to 82% of annual average income. The same interpretation applies to the other results. For hours worked, physicians would be willing to give up $9700 of their annual salary not to work an extra hour per week, which works out to an hourly wage of about $183. This is 37% higher than the imputed average hourly wage of $134.

The willingness-to-pay values for the 2 subsamples (rural specialists and physicians with a Canadian undergraduate degree) were not substantially different from those for the entire sample, although the rural specialists' willingness to pay was generally greater in magnitude. The willingness to pay not to work an extra hour per week, for example, was $222.56 for the rural specialists and $189 for physicians with a Canadian undergraduate degree. Another notable difference for the rural specialists subsample was a much higher willingness to pay to avoid moving from a 1-in-8 on-call ratio to a 1-in-2 on-call ratio (96% of income compared to 82% for the entire sample).

DISCUSSION

The survey was completed by nearly 25% of all physicians in Manitoba. The sample of respondents was largely representative of the physician population in Manitoba.[4] The proportion in each age group in the sample roughly corresponded to the Manitoba average.[29] The DCE questions yielded about 4300 usable responses, which is more data than required by a number of measures.[31,32] When respondents had the option to choose "current job" in the second DCE question, 65% of them always chose it, which is consistent with other DCEs that included a "current job" option.[33]

The results echo those in the literature, which indicates that income, hours worked and on-call duties are among the most important attributes for recruitment and retention.[6,33] Careful consideration toward maintaining a good work–life balance as well as ensuring professional interaction are recognized as important considerations for health workforce planning.[34]

There are several important outcomes and policy implications from the survey. First, on-call is a significant contributor to job (dis)satisfaction; anything less than a 1-in-4 ratio was highly undesirable, while anything more than 1-in-4 (up to 1-in-6) was not worth any additional income. A 1-in-8 ratio was worth about 15% of annual income more than a 1-in-4, 1-in-5 or 1-in-6 ratio. Financial incentives for frequent on-call duties (1-in-3 or more) would

Table 10: Willingness to pay to avoid moving from a better level to a less desirable level

		Willingness to pay	
Attribute	Level change	$/yr	% increase/yr
Hours	Increase by 1 hr/wk	9700	2.6
On-call ratio	From 1-in-8 to 1-in-2	308 000	82.1
	From 1-in-6 to 1-in-2	249 000	66.4
	From 1-in-5 to 1-in-2	249 000	66.4
	From 1-in-4 to 1-in-2	250 000	66.7
Practice type	From group to solo	117 000	31.2
	From hospital-based to solo	71 500	19.1
Community incentives	From during first year to none	41 700	11.1
Housing availability	From adequate to poor	67 600	18.0
Clinic technology	From electronic medical record and telehealth to no technology	61 400	16.4
Location	From medium and close to medium and far	82 500	22.0
	From medium and close to small and far	83 000	22.1

have to be very large: 66% of annual income for those with 1-in-4 on-call duties or less frequent to accept a 1-in-3 or 1-in-2 ratio, and 82% of annual income for those with an on-call frequency of 1-in-8 to accept the same ratios. Other policy options (such as alternating on-call duties between different clinics) would likely be needed. Furthermore, an on-call ratio of 1-in-4 was a threshold, with anything less frequent (up to 1-in-6) being valued equally by the respondents. This is lower than the Society of Rural Physicians of Canada's recommendation that on-call schedules include at least 5 participating physicians.[35]

Several of the attributes that reflected the need for professional and social inclusion were found to be important: group practice, community incentives (during the first year) and access to clinic technology, particularly telehealth. Physicians preferred group practices to hospital-based and solo practices, with group practices being the most preferred. Physicians working in a hospital-based practice would need to be compensated 19% of annual income to work solo, and physicians in a group practice would need over 30%. Community incentives during the year were worth 11% of annual income, and clinic technology that includes both electronic medical records and telehealth, 16%. These are sizable valuations and suggest that investments that connect rural physicians professionally (and socially) are worthwhile.

Adequate housing availability was important, although no significant difference was found between "poor" and "limited;" this may have been due to the wording of the DCE levels. Adequate housing was worth about 18% of annual income, which emphasizes the importance of aspects of life outside work. Location mattered: medium-sized towns within a 3-hour drive of Winnipeg were the most preferred, and small and medium-sized towns more than 3 hours from Winnipeg were the least preferred. Most of the towns that fit the "medium and far" description are northern communities (Thompson, The Pas, Flin Flon), with the exception of Dauphin (a 3.5-hour drive). City as a level was deliberately excluded as an option in the DCE to avoid respondents' choosing jobs based only on this and ignoring the other attributes. Finally, hours worked was important: 1 additional hour was valued at $183, and hours worked also played a consistent role in the job satisfaction questions. The imputed average hourly wage in the sample was $134, so additional hours were valued about 37% above the average gross hourly wage.

The willingness-to-pay results of the DCE show possible trade-offs to compensate for less desirable job attributes. For example, a physician in a hospital-based practice with no clinic technology is almost compensated for a move to a solo practice by having all technology available, since the compensation required for moving from a hospital-based practice to a solo practice ($71 500) is just slightly higher than the willingness to pay to trade off no technology for electronic medical records and telehealth ($61 400). Along the same calculations, changing all attribute levels to their best possible level is only just enough compensation to accept a 1-in-2 on-call ratio over a 1-in-8 ratio, further underscoring the burden of high on-call frequency and the need for other solutions.

Limitations

There are several limitations. First, other factors affect rural life, such as social interactions, recreation, children's education and cultural aspects. These may be more important for certain physicians, such as international medical graduates, who come to Canada from different cultures. This survey elicited preferences only for certain aspects of rural life and work; however, these were chosen in discussion with physicians and policy-makers who are familiar with rural practice and so are likely to be among the most influential, at least for Manitoba. Second, the survey was sent only to physicians in Manitoba, so the results may not be generalizable to other jurisdictions. However, since Manitoba's rural communities are characterized by above-average isolation from metropolitan zones[36] and a cold climate, the estimates reported here likely form an upper boundary on the incentives required for physicians to accept these job attributes. Third, the terminology to describe the attributes was sometimes a catchall. For example, "community incentives" can include a variety of incentives, ranging from complementary community club memberships for the physician and family to initial provision of office staff paid by the community. Future research should include a deeper investigation into specifying what these attributes should incorporate.

CONCLUSION

This is a comprehensive and methodical study of rural job preferences in Manitoba, where the problem of rural recruitment and retention is acute. The results show that financial compensation for high on-call frequency is very expensive, if valued appropriately. Other undesirable job attributes are compensable; for example, for a physician to work in a

solo or hospital-based practice rather than a group practice, improving clinic technology would be a feasible solution.

The paper makes 2 main contributions. First, it presents comprehensive information regarding preferences for rural job attributes and incentives collected from physicians in Manitoba. Second, the methodology has provided monetary valuations of nonpecuniary benefits, showing the amount of compensation required for certain job attributes, which can be used to design more successful rural incentive packages.

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Appendix 1: Attributes and levels used in the discrete choice experiment

Attribute	Level
Remuneration, $	500 000
	450 000
	400 000
	350 000
	300 000
	250 000
Hours worked per week	35
	45
	55
	65
Spousal employment opportunities	Acceptable
	Some
	Limited
On-call ratio	1-in-8
	1-in-6
	1-in-5
	1-in-4
	1-in-3
	1-in-2
Type of practice	Interprofessional
	Group
	Solo
	Hospital-based
Additional rural training	Periodic sessions
	One-time session
	None
Community incentives	Provided continuously while working in community
	Provided during first year of work in community
	None offered
Housing availability	Adequate
	Limited
	Poor
Clinic technology	Electronic medical record and telehealth facilities
	Electronic medical record
	No existing e-health technology
Location	Population 5000–15 000; ≤ 3-hr drive to Winnipeg
	Population 5000–15 000; > 3-hr drive to Winnipeg
	Population < 5000; ≤ 3-hr drive to Winnipeg
	Population < 5000; > 3-hr drive to Winnipeg

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Early-career work location of Memorial University medical graduates: Why the decline in rural practice?

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Introduction: In a previous study, we found a decline in the proportion of Memorial University of Newfoundland (MUN) medical alumni practising in rural areas, particularly in Newfoundland and Labrador. The current study focused on the work location of recent graduates and examined the predictors of working in rural Canada and in rural Newfoundland and Labrador within the first 15 years following graduation.
Methods: We linked data from graduating class lists and the alumni and postgraduate databases with Scott's Medical Database to create a record of all graduates from 1973 to 2008, including their work location. We identified differences and significant predictors for each outcome and then described and compared the characteristics of 4 cohorts of graduating classes.
Results: In their early career, 127/1113 (11.4%) MUN medical graduates were working in rural Canada, and 57 (5.1%) were working in rural Newfoundland and Labrador. Having a rural background and being a family physician were predictors of working in rural Canada, and having a rural background, doing at least part of the residency at MUN, being from Newfoundland and Labrador and being a family physician were predictors of working in rural Newfoundland and Labrador. Seventy-four (13.6%) and 33 (6.1%) of 1989–1998 graduates worked in rural Canada and rural Newfoundland and Labrador, respectively, compared to 53 (9.3%) and 24 (4.2%), respectively, of 1999–2008 graduates.
Conclusion: The proportion of MUN medical graduates who worked in rural communities early in their career decreased among recent cohorts. The results show the impact of changes in the characteristics of MUN medical graduates, who increasingly opt for specialist practice and residency training outside the province, and the important role of local postgraduate training.

Introduction : Une étude antérieure a révélé une baisse du nombre de diplômés en médecine de l'Université Memorial de Terre-Neuve (MUN) exerçant en région rurale, plus particulièrement à Terre-Neuve-et-Labrador. L'étude actuelle portait sur le lieu de travail de diplômés récents et sur les prédicteurs du travail en milieu rural au Canada et dans la province de Terre-Neuve-et-Labrador dans les 15 premières années suivant l'obtention du diplôme.
Méthodes : Nous avons établi un lien entre les listes de diplômés, les bases de données des anciens et des postdoctorants et la Base de données médicales Scott's afin de créer un dossier de tous les diplômés de 1973 à 2008, y compris de leur lieu de travail. Nous avons établi des différences et des prédicteurs importants pour chaque résultat et avons ensuite décrit et comparé les caractéristiques de 4 cohortes de classes de diplômés.
Résultats : Au début de leur carrière, 127 sur 1113 (11,4 %) diplômés en médecine de MUN travaillaient en région rurale au Canada et 57 (5,1 %) en région rurale à Terre-Neuve-et-Labrador. Le fait de venir d'un milieu rural et d'être un médecin de famille était des prédicteurs de travail en milieu rural au Canada alors que le fait de venir d'un

milieu rural, d'avoir fait au moins une partie de sa résidence à MUN, d'être originaire de Terre-Neuve-et-Labrador et d'être médecin de famille étaient des prédicteurs de travail en milieu rural à Terre-Neuve-et-Labrador. Soixante-quatorze (13,6 %) et 33 (6,1 %) diplômés de 1989 à 1998 travaillaient en milieu rural au Canada et en milieu rural à Terre-Neuve-et-Labrador, respectivement, par comparaison à 53 (9,3 %) et à 24 (4,2 %), respectivement, pour les diplômés de 1999 à 2008.

Conclusion : La proportion de diplômés en médecine de MUN qui ont travaillé dans des localités rurales au début de leur carrière a diminué au sein des cohortes récentes. Les résultats de notre étude montrent l'incidence du changement des caractéristiques des diplômés en médecine de MUN, lesquels choisissent de plus en plus de se spécialiser et de faire leur résidence à l'extérieur de la province, ainsi que le rôle important de la formation médicale postdoctorale à l'échelle locale.

INTRODUCTION

Part of the social accountability mandate of medical schools is to address the local, regional and national physician workforce.[1,2] Medical schools, through their "organization, location and mission play a significant role in rural health care by designing and facilitating medical training policies and programs that contribute to recruitment and retention efforts."[3] Local graduates (that is, students from the province, those who graduated from local medical schools or those who completed residency training in the province) are seen as key contributors to a stable workforce of rural physicians, since they are more likely to work in smaller communities, remain longer in those communities and be familiar with local culture and practices.[2,4–9]

The medical school of Memorial University of Newfoundland (MUN), St. John's, was established in 1967 to meet the local need for physicians, particularly in rural communities. Previously, in an effort to show MUN's social accountability, we examined the work locations of physicians in the graduating classes of 1973–1998 and of 1973–2008.[4,10] In 2004, 86.8% of MUN medical graduates were working in Canada, with 30.7% in Newfoundland and Labrador, and 12.6% in rural Canada (including rural Newfoundland and Labrador [6.1%]). In 2014, the corresponding figures were 88.1%, 34.2% and 11.6% (4.9%).[11] Given the decline in the proportion of alumni practising in rural areas, we performed a study to determine how many MUN medical graduates work in rural communities in Canada and in Newfoundland and Labrador early in their career, and what factors predict whether MUN medical graduates work in rural communities early in their career. The focus was on recent graduates because physicians are more likely to work in rural communities early in their careers, with many subsequently moving to urban communities.[6–8] Few urban physicians "convert" to rural practice as their careers progress.[9]

METHODS

As previously described,[4,10] data were linked from graduating class lists, the alumni database and the postgraduate database with Scott's Medical Database to create a data set of all graduates from MUN medical school, with their 2004 work location identified. Data were linked with the use of first, last and maiden names as well as sex and graduation year, since this information is common to each data source. The original database included graduates from 1973 (the first class) to 1998. We then repeated the linking strategy to update the database to include graduates from 1973 to 2008, with graduates' 2014 work location identified.[11] The cut-off for year of graduation was set at 6 years before the work location to allow sufficient time for graduates to complete their residency training and enter practice.

Physicians who had died or retired (no longer part of the physician workforce), military physicians (limited ability to choose their practice location) and trainees sponsored by the Malaysian government (required to return home after completing their training), were excluded from the sample. This information is included in the alumni database and in Scott's Medical Database. We made additional efforts, such as reviewing publications from MUN alumni magazines, to identify deceased and retired physicians.

We examined 2 dependent variables related to physicians' early-career work location: work in rural Canada (yes/no) and work in rural Newfoundland and Labrador (yes/no). We obtained work location from the 2004 or 2014 Scott's Medical Database, supplemented by the alumni database. Both databases are routinely updated when new information is received. Work location com-

munities were coded as urban (10 000 or greater population) or rural (less than 10 000 population) based on their 2001 census population.[12] We included "bedroom communities" as part of larger urban centres, based on Statistics Canada metropolitan influence scores.[13] To be consistent across studies and to allow direct comparisons, we used the 2001 census population and the population cutoff of 9999 for rural communities.

We examined the following variables in the analyses: decade of graduation, sex, home community (rural/urban), from Canada (yes/no), from Newfoundland and Labrador (yes/no), completed at least some residency training at MUN (yes/no), specialty (family physician/specialist), age at graduation (< 30 or ≥ 30 yr) and graduation year (1989–1998/1999–2008). We used hometown, reported at the time of admission and included on the graduating class lists, to determine whether graduates were from Canada, from Newfoundland and Labrador, and from a rural community. We coded hometowns as urban or rural using the same approach as for work location. Specialty was based on the physician's certified specialization recorded in Scott's Medical Database, supplemented by the alumni database. Each physician was coded as either a family physician (general practitioner or family medicine specialist) or a specialist.

The analyses were carried out with the use of SPSS software (version 22.0) and were conducted in 2 parts. In part 1, the sample was limited to graduates from 1989–1998 and from 1999–2008 who had known work locations in 2004 and 2014, respectively. We used χ^2 tests to identify differences between predictors and each outcome (2004 work location for 1989–1998 graduates and 2014 work location for 1999–2008 graduates). We then used multiple logistic regression to identify significant ($p < 0.05$) predictors for each outcome. Potential predictors for each regression model were selected on the basis of the χ^2 tests. We examined variables for possible colinearity before starting the regression analyses. Predictors were removed from the model if they were not significant (based on the Wald test) and if they did not significantly improve the change in the –2 log-likelihood value.[14] The tables presented in the Results section list all the variables included in each of the final regression models.

The second part of the analyses included all eligible MUN alumni (1973–2008), regardless of whether work location was known. We used χ^2 tests to describe and compare the characteristics of 4 cohorts of graduating classes (1973–1978, 1979–1988, 1989–1998 and 1999–2008). These analyses provided a complete portrayal of the changing characteristics of MUN medical graduates and indicated whether differences between the classes of 1989–1998 and 1999–2008 were consistent with larger trends.

Ethics approval

The Newfoundland and Labrador Health Research Ethics Board approved this study (HREB no. 14.065).

RESULTS

Between 1973 and 2008, MUN graduated 1996 physicians. We excluded 47 physicians who had died, 10 who had retired, 13 who were sponsored by the Malaysian government and 779 who graduated before 1989, leaving 1147 physicians. Work location was known for 1113 (97.0%) of the 1147.

The majority of physicians in the study were female (53.2%), from urban hometowns (66.9%), from Canada (93.6%), from Newfoundland and Labrador (72.9%), specialists (58.6%) and under 30 years old at graduation (82.0%) (Table 1). More than half (581 [52.2%]) did at least some part of their postgraduate residency training at MUN. Early in their careers, roughly 1 in 9 (11.4%) was working in a rural community in Canada, and 1 in 20 (5.1%) was working in a rural community in Newfoundland and Labrador.

Compared to the study sample, a larger proportion of physicians excluded from the study because their early-career work location was unknown were male, were not from Canada, were not from Newfoundland and Labrador, did not do any residency training at MUN and graduated in 1999–2008.

Compared to physicians who did not work in a rural community in Canada early in their careers, a larger proportion of those who worked in a rural community had a rural background, did at least some of their residency at MUN, were family physicians and graduated in 1989–1998 (Table 2). Seventy-four graduates (13.6%) from 1989–1998 worked in a rural community in Canada early in their careers, compared to 53 (9.3%) of those from 1999–2008 ($p = 0.02$). Physicians with a rural background and family physicians were more likely to have worked in a rural community in Canada (Table 3).

Compared with graduates who did not work in a rural community in Newfoundland and Labrador, a

larger proportion of graduates who worked in a rural community in the province had a rural background, were from Newfoundland and Labrador, did at least some of their residency at MUN and were family physicians (Table 2). Thirty-three graduates (6.1%) from 1989–1998 worked in a rural community in the province early in their careers, compared to 24 (4.2%) of those from 1999–2008. Physicians with a rural background, Newfoundlanders, those who did at least some of their residency training at MUN and family physicians were more likely to work in a rural community in the province (Table 3).

Table 1: Characteristics of MUN medical graduates who graduated in 1989–1998 or 1999–2008

Characteristic	No. (%) of physicians (n = 1113)
Sex	
Male	521 (46.8)
Female	592 (53.2)
Hometown classification	
Urban	745 (66.9)
Rural	357 (32.1)
Unknown	11 (1.0)
From Canada	
No (international)	61 (5.5)
Yes	1042 (93.6)
Unknown	10 (0.9)
From Newfoundland and Labrador	
No	291 (26.1)
Yes	811 (72.9)
Unknown	11 (1.0)
Did at least some residency training at MUN	
No	516 (46.4)
Yes	581 (52.2)
Unknown	16 (1.4)
Specialty	
Specialist	652 (58.6)
Family physician	460 (41.3)
Unknown	1 (0.1)
Age at graduation, yr	
< 30	913 (82.0)
≥ 30	190 (17.1)
Unknown	10 (0.9)
Graduation year	
1989–1998	542 (48.7)
1999–2008	571 (51.3)
Worked in rural Canada early in career	
No	986 (88.6)
Yes	127 (11.4)
Worked in rural Newfoundland and Labrador early in career	
No	1056 (94.9)
Yes	57 (5.1)

MUN = Memorial University of Newfoundland.

In part 2 of the analysis, all MUN medical alumni who graduated between 1973 and 2008 were included (n = 1996). We excluded 47 physicians who had died, 10 who had retired and 13 sponsored by the Malaysian government, leaving 1926 physicians, of whom 249 graduated between 1973 and 1978, 530 between 1979 and 1988, 550 between 1989 and 1998, and 597 between 1999 and 2008. The proportion of women in each cohort grew over time (Figure 1). Starting in the 1990s, the proportion of physicians who completed residency training at MUN declined, as did the proportion who became family medicine specialists (Figure 1). The proportion of physicians with a rural background began to increase in the 1980s. Detailed comparisons are shown in Table 4.

DISCUSSION

By replicating earlier study methods[4,10] (and using 2001 populations to define rural communities), we were able to compare 2 cohorts of newly graduated physicians in their first years of practice. These cohorts had substantially different work location patterns. The proportion of MUN medical graduates who worked in rural communities early in their career decreased over the study period: 13.6% and 6.1% of 1989–1998 graduates, compared to 9.3% and 4.2% of 1999–2008 graduates, worked in a rural community in Canada and in a rural community in Newfoundland and Labrador, respectively. Although studies show that recent MUN medical graduates are choosing to remain in Canada and in the province,[10,11] our findings confirm that new graduates are opting to work in urban communities early in their careers.

The change in the profile of MUN medical graduates, particularly in relation to the characteristics that predict rural practice, may explain these findings. For example, having a rural background and being a family physician are well-known predictors of rural practice in Canada and in Newfoundland and Labrador.[2–4,8] In addition, completing residency training in Newfoundland and Labrador is a predictor for rural practice in the province.[11] Although the proportion of graduates with a rural background was at an all-time high in the 1999–2008 cohort, a smaller proportion of these graduates than in earlier cohorts opted for family medicine or residency training at MUN. Moreover, the relative magnitude of the odds ratios for each of

these predictors also offers some insight into the relative importance of the graduates' characteristics. The odds ratios for being a family physician (for rural practice in either Canada or Newfoundland and Labrador) and for doing MUN residency training were greater than the odds ratio for having a rural background.

Our results highlight the role of local postgraduate training in the development and retention of rural physicians. Increasingly, researchers have found that a large proportion of rural physicians work within close proximity to their postgraduate training site.[15–17] Studies of rural physicians in Newfoundland and Labrador have shown that physicians (especially MUN graduates) who had done any residency training at MUN were more likely than physicians who had not done postgraduate training at MUN to work in rural communities and to remain in such communities longer.[4,18] Those studies suggest that, to increase the number of physicians who opt for rural practice in Newfoundland and Labrador, MUN should not only continue to recruit rural students but also encourage these students to become family physicians and to complete their residency training at MUN. However, in 2013, less than half of MUN residency positions were filled by MUN graduates; in family medicine, 35 (52%) of the 67 2-year training program seats were filled by MUN graduates.[19]

We found that the proportion of women in the cohorts increased over the study period. However, our results also show that sex is not a predictor of rural practice. The lower rate of rural practice is not due to the increasing number of women among MUN medical graduates.

Table 2: Characteristics of MUN medical graduates who worked or did not work in rural Canada and in rural Newfoundland and Labrador early in their career

	Worked in rural Canada, no. (%) of physicians			Worked in rural Newfoundland and Labrador, no. (%) of physicians		
Characteristic*	No (n = 986)	Yes (n = 127)	p value	No (n = 1056)	Yes (n = 57)	p value
Sex			0.2			0.5
Male	455 (46.1)	66 (52.0)		492 (46.6)	29 (50.9)	
Female	531 (53.8)	61 (48.0)		564 (53.4)	28 (49.1)	
Hometown classification			0.000			0.000
Urban	680 (69.6)	65 (52.0)		721 (69.0)	24 (42.1)	
Rural	297 (30.4)	60 (48.0)		324 (31.0)	33 (57.9)	
From Canada			0.1			0.07
No (international)	58 (5.9)	3 (2.4)		61 (5.8)	0 (0.0)	
Yes	920 (94.1)	122 (97.6)		985 (94.2)	57 (100.0)	
From Newfoundland and Labrador			0.4			0.000
No	262 (26.8)	29 (23.2)		289 (27.6)	2 (3.5)	
Yes	715 (73.2)	96 (76.8)		756 (72.3)	55 (96.5)	
Did at least some residency training at MUN			0.001			0.000
No	475 (48.9)	41 (32.8)		509 (48.9)	7 (12.3)	
Yes	497 (51.1)	84 (67.2)		531 (51.0)	50 (87.7)	
Specialty			0.000			0.000
Specialist	620 (62.9)	32 (25.2)		637 (60.4)	15 (26.3)	
Family physician	365 (37.0)	95 (74.8)		418 (39.6)	42 (73.7)	
Age at graduation, yr			0.9			0.8
< 30	809 (82.8)	104 (82.5)		865 (82.7)	48 (84.2)	
≥ 30	168 (17.2)	22 (17.5)		181 (17.3)	9 (15.8)	
Graduation year			0.02			0.2
1989–1998	468 (47.5)	74 (58.3)		509 (48.2)	33 (57.9)	
1999–2008	518 (52.5)	53 (41.7)		547 (51.8)	24 (42.1)	

MUN = Memorial University of Newfoundland.
*Some variables had missing data.

Table 3: Predictors of having worked in rural Canada and in rural Newfoundland and Labrador early in career

Variable	Location; OR (95% CI)	
	Rural Canada	Rural Newfoundland and Labrador
Hometown classification		
Urban	1.00	1.00
Rural	1.93 (1.31–2.85)	2.32 (1.33–4.08)
From Canada		
No	–	–
Yes	–	–
From Newfoundland and Labrador		
No	–	1.00
Yes	–	6.95 (1.65–29.24)
Did at least some residency training at MUN		
No	–	1.00
Yes	–	4.31 (1.90–9.76)
Specialty		
Specialist	1.00	1.00
Family physician	5.03 (3.28–7.72)	3.81 (2.05–7.06)
Graduation year		
1989–1998	–	–
1999–2008	–	–

CI = confidence interval; OR = odds ratio; MUN = Memorial University of Newfoundland.

Limitations

Our study has a number of limitations. We used administrative program data, which do not provide information on the full range of factors that influence work location. For example, the data do not include family characteristics (e.g., marital status, number and age of children) or other contextual factors (e.g., economic situation, government incentives) that may influence work location. In addition, we used a cross-sectional design, and physicians within each cohort will have been in practice for disparate periods, ranging from 5 to 13 years; many older physicians may have moved after working in a rural community for a number of years. Although our study sample included 97% of eligible physicians, our results may nonetheless underestimate the rural work location of men, international students, students from outside Newfoundland and Labrador, those who did not complete MUN residency training and 1999–2008 graduates, who were disproportionately excluded from the study sample because their early-career work location was unknown. Finally, we looked at 1 medical school in 1 Canadian province; results may not be generalizable to other medical schools or regions.

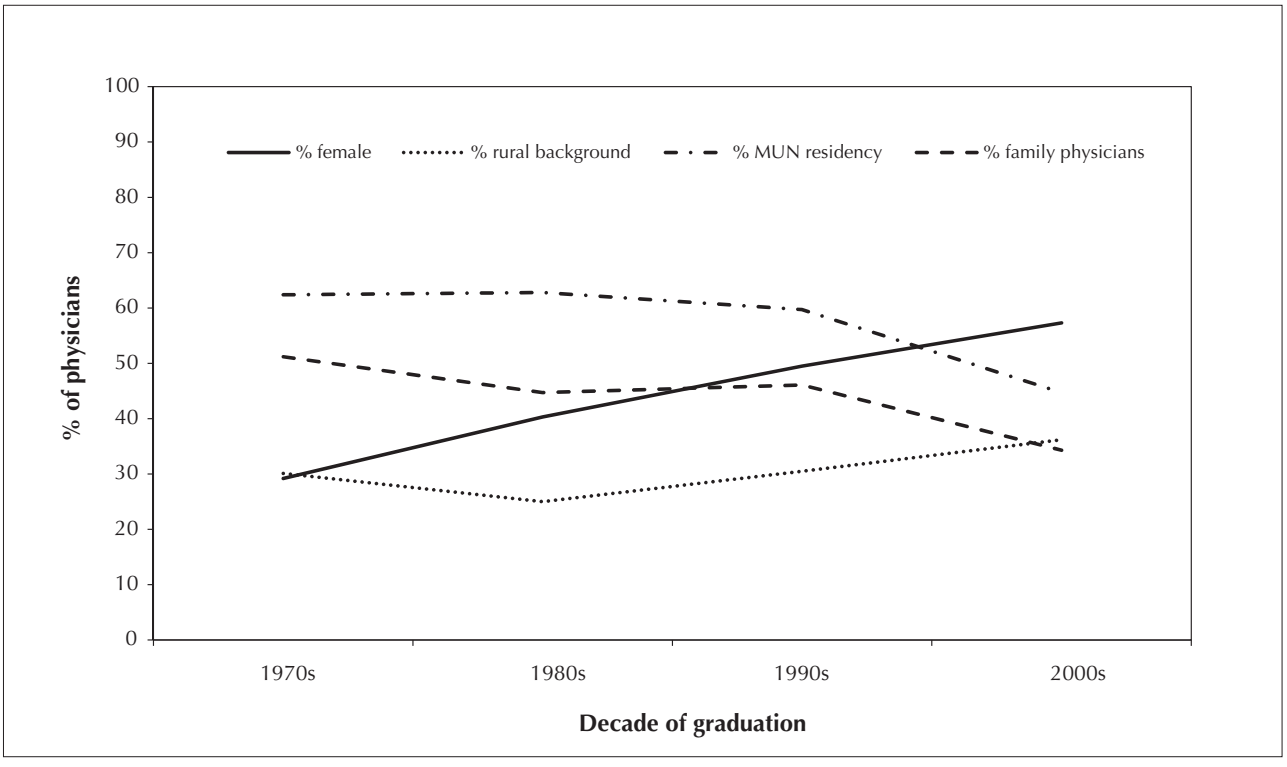

Fig. 1. Trends in selected characteristics of medical graduates of Memorial University of Newfoundland (MUN) from 1973 to 2008. There were significant differences in values over the decades for all characteristics; see Table 4 for details.

Table 4: Characteristics of MUN medical graduates by decade of graduation

Characteristic*	No. (%) of physicians					
		Decade of graduation				
	Overall (*n* = 1926)	1973–1978 (*n* = 249)	1979–1988 (*n* = 530)	1989–1998 (*n* = 550	1999–2008 (*n* = 597)	*p* value
Sex						0.000†‡§¶**††
Male	1047 (54.4)	181 (72.7)	322 (60.8)	280 (50.9)	264 (44.2)	
Female	879 (45.6)	68 (27.3)	208 (39.2)	270 (49.1)	333 (55.8)	
Hometown classification						0.000†**††
Urban	1328 (70.0)	167 (69.0)	395 (75.8)	398 (72.4)	368 (63.0)	
Rural	569 (30.0)	75 (31.0)	126 (24.2)	152 (27.6)	216 (37.0)	
From Canada						0.000‡§¶**††
No (international)	96 (5.0)	11 (4.5)	11 (2.1)	0 (0.0)	74 (12.6)	
Yes	1813 (95.0)	235 (95.5)	517 (97.9)	549 (100.0)	512 (87.4)	
From Newfoundland and Labrador						0.5
No	500 (26.2)	56 (22.8)	135 (25.6)	146 (26.5)	163 (27.9)	
Yes	1409 (73.8)	190 (77.2)	393 (74.4)	404 (73.4)	422 (72.1)	
Did at least part of residency at MUN						0.000§**††
No	826 (43.4)	96 (39.0)	191 (36.2)	207 (38.3)	332 (56.5)	
Yes	1075 (56.5)	150 (61.0)	336 (63.8)	333 (61.7)	256 (43.5)	
Specialty						0.000†§**††
Specialist	1086 (56.7)	113 (45.6)	305 (57.6)	287 (52.2)	381 (64.9)	
Family physician	828 (43.3)	135 (54.4)	224 (42.3)	263 (47.8)	206 (35.1)	
Age at graduation, yr						0.1
< 30	1604 (84.2)	215 (86.7)	457 (86.4)	452 (82.2)	480 (82.9)	
≥ 30	302 (15.8)	33 (13.3)	72 (13.6)	98 (17.8)	99 (17.1)	

MUN = Memorial University of Newfoundland.
*Some variables had missing data.
Post hoc tests: †1973–1978 differs significantly from 1979–1988, ‡1973–1978 differs significantly from 1989–1998, §1973–1978 differs significantly from 1999–2008, ¶1979–1988 differs significantly differs 1989–1998, **1979–1988 differs significantly from 1999–2008, ††1989–1998 differs significantly from 1999–2008.

CONCLUSION

The proportion of MUN medical graduates who worked in rural communities, whether in Newfoundland and Labrador or anywhere in Canada, early in their career decreased among recent cohorts. A total of 9.3% and 4.2% of 1999–2008 graduates worked in a rural community in Canada and in Newfoundland and Labrador, respectively, compared to 13.6% and 6.1%, respectively, of 1989–1998 graduates. Our findings illustrate the downstream impact of changes in the characteristics of medical students in Newfoundland and Labrador, who increasingly opt for specialist practice and residency training outside the province. It also highlights the importance of local postgraduate training. To increase the number of physicians who opt for rural practice, medical schools should not only continue to admit rural students but also encourage them to become family physicians and complete their residency training near the rural regions that hope to recruit them.

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Medical school outreach and mentorship for rural secondary school students: a pilot of the Southwestern Ontario Medical Mentorship Program

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Introduction: Rural communities in Canada face challenges with physician recruitment. Physicians from rural backgrounds are more likely to practise in rural areas; however, rural students are underrepresented in medical schools. To address this, the Southwestern Ontario Medical Mentorship Program (SWOMMP) was created to expose rural secondary school students to medical careers.
Methods: This pilot project involved a school-based interactive session run by rural medical students on paths to medicine, medical specialties and skills workshops of roughly 2.5 hours targeted to grades 10–12 university-level students in rural southwestern Ontario. Two sessions were held, 1 in a town with a population of 20 000 and the other in a town with a population of 5000. A survey was administered before and after the session to assess changes in interest in medical careers and in perceived barriers.
Results: Forty-five students participated in the sessions. After the sessions, 32 students (71%) were considering a career in health care, compared to 26 (58%) before the sessions. Almost all students (43 [96%]) found the session helpful or extremely helpful, and all reported they would recommend it to other classes. Finances, grades and length of schooling were the most commonly perceived barriers to pursuing a career in medicine; fewer students had concerns about finances and length of schooling after the sessions. Twenty-nine students (64%) enrolled in longitudinal mentorship with a medical student.
Conclusion: This pilot project showed that a rural secondary school outreach program run by medical students can increase high school students' interest in medical careers. The project will continue and aims to expand and improve using the pilot study's data.

Introduction : Les régions rurales au Canada ont de la difficulté à recruter des médecins et les médecins qui viennent eux-mêmes de milieux ruraux sont plus susceptibles d'exercer en région rurale. Cependant, les étudiants de régions rurales sont sous-représentés au sein des écoles de médecine. Pour aborder ce problème, le programme SWOMMP (Southwestern Ontario Medical Mentorship Program) a été créé afin de présenter des carrières en médecine aux élèves du secondaire de régions rurales.
Méthodes : Le projet pilote comprenait une séance interactive en milieu scolaire d'une durée d'environ 2.5 heures tenue par des étudiants en médecine de milieux ruraux. Les séances portaient sur le cheminement de carrière d'un médecin généraliste ou d'un médecin spécialiste et des ateliers sur les compétences ciblant les élèves de 10e, 11e et 12e année de régions rurales du sud-ouest de l'Ontario qui envisagent poursuivre des études universitaires. Deux séances ont été organisées, l'une dans une ville de 20 000 habitants et l'autre dans une localité de 5000 habitants. Un

sondage a été mené avant et après la séance pour déterminer les changements d'intérêt pour une carrière de médecin et des obstacles perçus.
Résultats : Quarante-cinq élèves ont participé aux séances. À la suite de celles-ci, 32 élèves (71 %) envisageaient une carrière en soins de santé, comparativement à 26 (58 %) avant les séances. Presque tous les élèves (43 [96 %]) étaient d'avis que la séance leur avait été utile ou extrêmement utile et tous les élèves ont signalé qu'ils la recommanderaient aux élèves d'autres classes. Les ressources financières, les résultats scolaires et la durée des études étaient les obstacles perçus les plus courants à la poursuite d'une carrière de médecin. Moins d'élèves se préoccupaient des ressources financières et de la durée des études à la fin des séances. Vingt-neuf élèves (64 %) se sont inscrits à un mentorat longitudinal auprès d'un étudiant en médecine.
Conclusion : Le projet pilote a permis de démontrer qu'un programme d'approche des écoles secondaires rurales, dirigé par des étudiants en médecine, peut accroître l'intérêt des élèves du secondaire pour une carrière en médecine. Le projet se poursuivra dans un but d'expansion et d'amélioration à l'aide des données de l'étude pilote.

INTRODUCTION

Rural communities in Canada face unique challenges in access to, and provision of, medical services, such as physician recruitment and retention. It is well described in the literature that physicians from rural backgrounds are more likely to practise in rural areas.[1,2] However, students from rural areas are significantly underrepresented in medical schools: although 22.4% of Canadian high school students are from rural areas, only 10.8% of medical students in this country come from rural areas.[3] This is most likely due to the fact that rural students are only 56% as likely to apply to medical school as urban students, even though there is no difference between the 2 groups in grade point average or Medical College Admission Test scores.[4]

Potential reasons for this disparity are the many barriers to entry specific to this population, including lack of exposure to medicine as a career, lack of medical role models, distance from academic centres and lack of the support services and programs in urban areas that help students to participate and excel in extracurricular activities — an important part of university and medical school applications.[5]

Another major barrier is the inadequacy of medical school and government outreach strategies to improve rural student recruitment.[1,3,5] Although many programs exist to recruit university students from rural backgrounds to medical school,[6,7] these programs often capture students who have long intended to go to medical school and who would most likely apply, even if such programs did not exist. Few, if any, programs aim to increase the number of rural students attending university with an interest in pursuing medicine. Thus, recruitment programs potentially draw on a motivated pool of rural applicants without increasing the size of the rural applicant pool in university.

The recommendations of the Society of Rural Physicians of Canada to increase rural medical student enrolment suggested that an increase in the number of rural high school students going to university with an interest in medicine as a career was necessary.[5] The society recommended the establishment of high school outreach programs for rural students involving medical students to address this problem.[5]

In response to the underrepresentation of rural students in medical schools and the recommendations of the Society of Rural Physicians of Canada, we created a pilot outreach program that sent medical students back to their home communities and high schools in rural southwestern Ontario. Our primary objective was to expose secondary school students to medical education and careers. The hope was to show current secondary school students that students from their schools had gone into medicine and thereby highlight medicine as an achievable career. The secondary objectives were to foster interest in medicine as a career, develop a longitudinal mentorship program by medical students for interested high school students, determine the effectiveness of the pilot program and collect data for its improvement.

METHODS

The pilot project was created by medical students from the Schulich School of Medicine and Dentistry

at Western University and the University of Ottawa Faculty of Medicine. It involved designing and implementing school-based interactive sessions of roughly 2.5 hours targeted to grade 11 and 12 university-level students in southwestern Ontario. Sessions were run by medical students who had lived in the communities and had graduated from the secondary schools where the sessions were held. Initially, for convenience reasons, medical students involved in running the sessions were those involved in designing the outreach program. The medical students hosting the sessions contacted former teachers, specifically biology teachers, at their alma mater and arranged for dates to present the pilot project to students at the school. The program was called the Southwestern Ontario Medical Mentorship Program (SWOMMP).

Sessions included the following: a 5-minute introduction of the medical students; a 20-minute "What is Medicine and Why to Do It" talk about different medical specialties (what the specialists do and why it is a rewarding career); a 20-minute "Paths to Medicine" talk on the process of applying to medical school and the path through medical school and residency and ultimately becoming a physician; a 30-minute medical school lecture on basic cardiac pathology and the cardiac physical examination; a 30-minute interactive heart auscultation workshop teaching students how to use the stethoscope and identify heart sounds, integrating the didactic lecture with hands-on skills; a 30-minute workshop on the basic tools and techniques of suturing; and a 15-minute question-and-answer session with a mentorship focus during which the medical students' contact information was distributed to create long-term mentorship relationships for interested students, to help them during their university careers and potential medical school applications in the future.

Schools that participated in this initial pilot were chosen by convenience sampling. All students present on the presentation day who were enrolled in grade 10–12 university-level science or biology courses were eligible.

Surveys were administered before and after the session to assess program effectiveness and changes in students' perceptions, and to improve the program for future sessions. Questions in the survey were developed with the use of common themes in literature such as previously documented barriers in accessing medical education.[5] The surveys collected both quantitative and qualitative data.

We obtained detailed demographic characteristics to assess correlation of demographic factors and outcomes. Outcomes measured were changes in students' self-reported interest in health care careers, interest in a career as a physician, perceived barriers to medical school and a career as a physician and students' opinion of the helpfulness of the sessions. Content analysis approach with a primarily qualitative analysis was used. Closed-ended questions were quantified and tallied, and open-ended questions were coded and grouped with like responses.

Ethics approval

This study was exempt from ethics approval according to the guidelines set out by the Western University Research Ethics Board. However, we considered ethical issues in the study design using the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2). Consent was obtained from all students participating in the session and surveys, and students had the ability to withdraw from the session or surveys at any time. Strict privacy and confidentiality were maintained in data collection. Student responses were collected anonymously, without personal or identifying data on the surveys. Responses were amalgamated, and only cumulative data are presented.

RESULTS

The SWOMMP pilot project involved 2 sessions run by 2 medical students, 1 at a secondary school in a town with a population of 20 000, and the other at a secondary school in a town with a population of 5000. Towns were located more than 180 km from the nearest academic medical centre. The program was extremely well received by both the students and staff of the schools. Staff indicated a willingness to have their classes participate in future years of the program.

Forty-five students ranging in age from 15 to 19 (mean 17) years in grades 10 through 12 participated in the sessions and completed anonymous pre- and postsession surveys (Table 1), with 100% participation. The classes were of a pre-university level, and 44 respondents (98%) reported that they intended to pursue a university-level postsecondary education. Thirty-nine students (87%) had parents with a postsecondary school education or higher. No students reported having an immediate family

Table 1: Demographic characteristics of students participating in 2 sessions of the Southwestern Ontario Medical Mentorship Program

Characteristic	All students (*n* = 45)	Location: Small town (*n* = 34)	Location: Large town (*n* = 11)
Age, mean ± SD, yr	17.0 ± 1.0	16.8 ± 1.0	17.5 ± 0.8
Population of hometown	–	5000	20 000
Planned to attend university, no. (%)	44 (98)	33 (97)	11 (100)
Parents had postsecondary education, no. (%)	39 (87)	29 (85)	10 (91)
Extended family member is physician, no. (%)	9 (20)	8 (24)	1 (9)

SD = standard deviation.

member who was a physician, although 9 (20%) had an extended family member in medicine.

Following the session, the number of students who reported that they would consider a career in the health care field increased from 26 (58%) to 32 (71%) (Table 2). The number of students who reported that they would consider a career as a physician increased from 17 (38%) to 20 (44%) (Table 2). More notably, the number of students reporting no interest in a career as a physician decreased by half after the session, from 14 (31%) to 7 (16%). All of the students reported that they would recommend the session to future classes, with 31 students (69%) highly recommending it. Twenty-six students (58%) rated the session as extremely helpful, and 17 (38%) rated it as helpful. Only 2 students (4%) rated it as neutral, and no students rated it negatively.

Before the session, finances and costs, grades and length of schooling were the most commonly reported perceived barriers to pursuing medicine (Fig. 1). Grades remained an equally prevalent factor following the session, but all other factors were reported less frequently (Fig. 1). Most notably, no student reported lack of knowledge about how to pursue medicine as a barrier after the session.

Students stated that they would have liked more information regarding different specialties, skills acquisition, the medical school curriculum and other fields in health care (Fig. 2). Finally, 29 students (64%) reported that they would like to be involved in longitudinal mentorship with a medical student.

Table 2: Number of students interested in or considering a career in health care or as a physician before and after SWOMMP session

Variable	Response; no. (%) of students (*n* = 45)*: Yes	No	Neutral
Considering career in health care			
Before SWOMMP	26 (58)	8 (18)	9 (20)
After SWOMMP	32 (71)	4 (9)	7 (16)
Considering career as physician			
Before SWOMMP	17 (38)	14 (31)	12 (27)
After SWOMMP	20 (44)	7 (16)	16 (36)

SWOMMP = Southwestern Ontario Medical Mentorship Program.
*Data missing for 2 students.

DISCUSSION

Some of the objectives of this study included assessing the effectiveness and viability of the pilot project, and gathering data for improving and eventually expanding the program. By sharing the knowledge acquired we hope to encourage the creation of similar programs by other medical students from across Canada.

Overall, the pilot program was successful, as gauged by how it was received by students and staff, and invitations to host future sessions. Almost all students in the study found the session helpful, and all indicated they would recommend the session to future classes, which suggests that it was informative and engaging, even for students not planning to pursue careers related to health care. Building a program that students found helpful and would recommend to their peers was important to allow for invitations to return to the schools and to ensure student engagement. These preliminary results suggest that SWOMMP provided a useful outreach program that gave secondary students a better understanding of pursuing a career in medicine.

In addition, the project appeared to be successful in increasing interest in medicine as a career. Reported rates of interest in health care and medi-

cal careers increased after the session, and the number of students with no interest in medicine decreased by 50%. While this interest may be short-lived in many students, generating early interest and knowledge of the application process will leave those who do want to go to medical school better prepared. The long-term hope is that the program will prevent perceived barriers, lack of knowledge about the process and late discovery of medical interest from discouraging rural students from applying to medical school. However, as a pilot project, this study assessed whether the program is able to increase interest at all, even if transiently. We hope longer-term interest will be maintained through the longitudinal mentorship program.

In our study, as also reported in the literature,[3] financial considerations were the most frequently perceived barrier to attending medical school. During the session, the medical students discussed the wide variety of funding options, bursaries and financial aid available, which appeared to alleviate some of the concern about finances, as 53% of students perceived finances as a barrier after the session, compared to 82% before. SWOMMP was also able to completely eliminate the lack-of-knowledge barrier students saw to attending medical school as well as ease concerns about the length of schooling. Future improvements will aim to build these concerns into the program and address them for students.

The pilot project was also successful in establishing interest in a mentor network for students as they go on to university. About two-thirds of students requested to be involved in longitudinal mentoring and were given a medical student's contact information for any questions they had or general guidance as they go through university. However, the program at this stage is still in its infancy. As SWOMMP continues to expand, the goal is to have a more formal mentor network. Mentors would give a yearly school workshop and meet with an assigned mentee once a year to touch base, in addition to offering long-distance guidance during the year. Surveys will continue to be distributed for program improvement and metric tracking over time. Once the program is more established, the hope is to assess the viability of the program and mentorship in increasing medical school enrolment by rural students.

As the program continues year to year, longitudinal data on students' education and career paths will be collected. Rural students' interest in medicine and success in applying to medical school will be captured through the longitudinal mentorship program. Future studies will assess the success of the program in these areas.

Limitations

The main limitation of this study is that it is a single measurement of student interest at one point in time, without follow-up. This limitation was beyond the scope of the study. It was designed as a

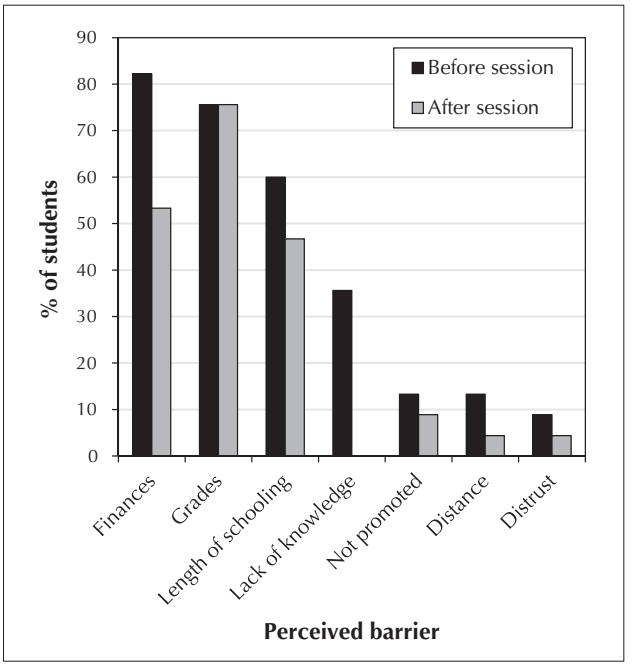

Fig. 1. Students' perceived barriers to medical education and careers.

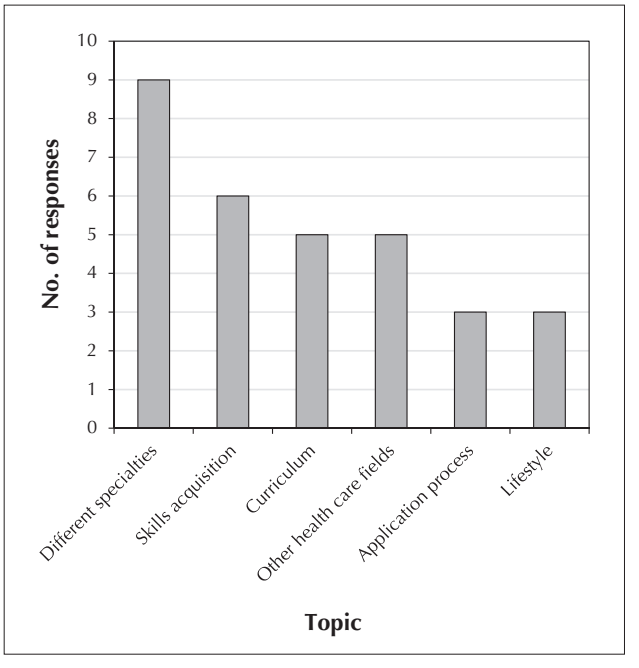

Fig. 2. Topics students would like to learn more about in future outreach sessions.

pilot project to assess the viability of SWOMMP and its ability to increase interest in medicine as a career, even if just transiently. In this respect, the pilot study was successful. Future work is planned to address the limitation and the large gap between our results and the ultimate goal of SWOMMP: to increase the number of rural medical students and, it is hoped, access to physicians in rural areas.

Other limitations include a small sample, self-reported data and the convenience sample of alma mater schools and medical students, which introduced potential bias into the results. We hope to address these limitations by expanding SWOMMP to more schools.

CONCLUSION

The SWOMMP pilot project showed the viability of a rural secondary school mentorship and outreach program run by medical students. More students reported an interest in medicine after the program, and the majority of students requested to participate in longitudinal mentorship. We will use the data and information gained in this pilot study to improve the content of the program and tailor it toward student concerns and interests. The project will continue yearly in rural southwestern Ontario communities and aims to expand in size, geographic area and longitudinal follow-up.

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Country cardiograms case 59

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This article has been peer reviewed.

A 66-year-old man presents to a rural British Columbia emergency department with fatigue and dizziness. He is noted to have a slow pulse rate. He has had left bundle branch block on previous electrocardiograms. He takes diltiazem for treatment of hypertension. The following tracing is recorded (Fig. 1). What is the interpretation, and what should be done?

For the answer, see page 76.

Competing interests: None declared.

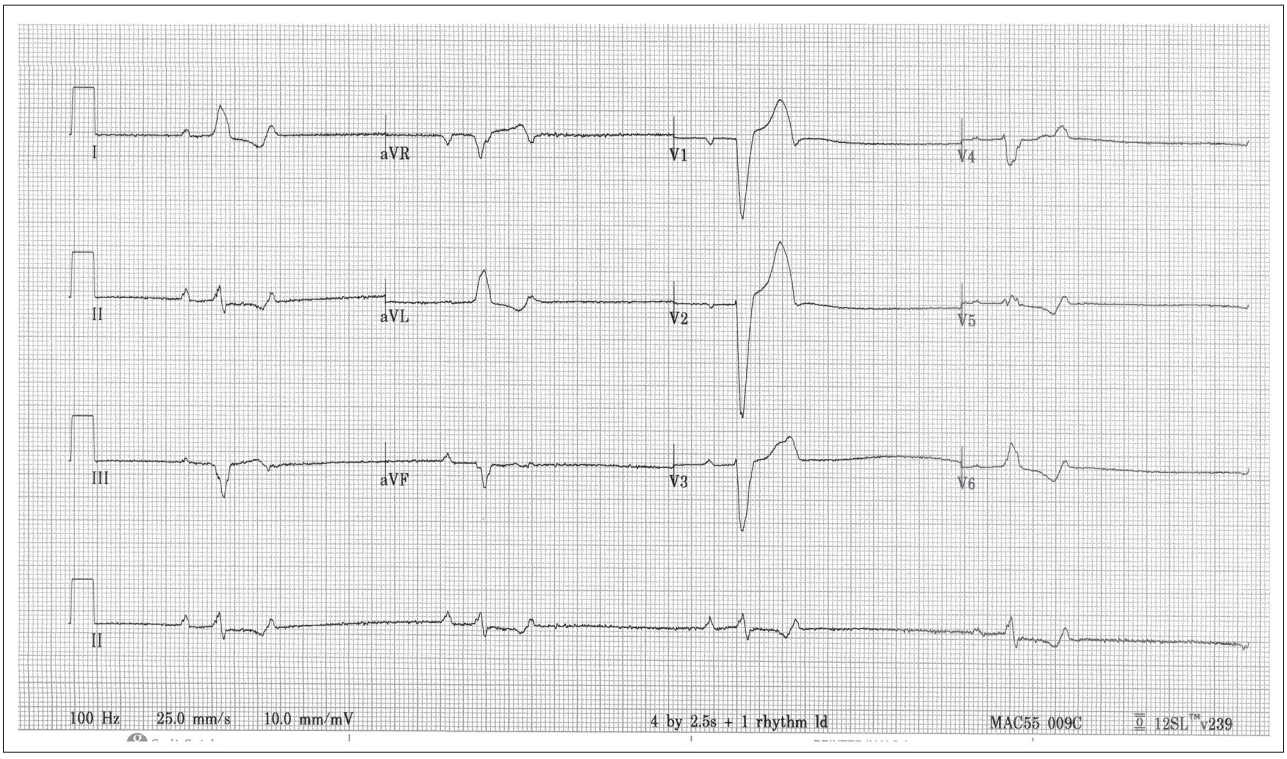

Fig. 1. Electrocardiogram of a 66-year-old man with fatigue, dizziness and a slow pulse rate.

"Country cardiograms" is a regular feature of *CJRM*. We present an electrocardiogram and discuss the case in a rural context. Please submit cases to Suzanne Kingsmill, *CJRM*, 45 Overlea Blvd., P.O. Box 22016, Toronto ON M4H 1N9; manedcjrm@gmail.com.

The occasional treatment of opioid use disorder

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INTRODUCTION

Opioid use disorder (OUD) has become common in many regions of Canada, particularly in rural northwest Ontario.[1,2] In the past, addicted patients had to access methadone-dispensing physicians if opioid agonist therapy was indicated. This generally took patients out of a primary care setting and away from their community, where robust addiction services were absent.[3,4] Rural physicians who decide that opioid agonist therapy is a good option for their patient may now consider initiating sublingual buprenorphine/naloxone combination therapy in the office setting or even offer home induction.[5–12] Rural physicians may encounter patients who mismanage their opioid prescriptions and are subsequently found to have OUD. Treating the addiction locally can help patients eliminate much of their dysfunctional behaviour and allow them to identify underlying life issues.

Buprenorphine/naloxone combination therapy was approved for the treatment of opioid dependence in 2003 in the United States and in 2007 in Canada. Numerous cases of safe office-based and home induction of buprenorphine/naloxone therapy have been documented. [5–12] This combination agonist–antagonist medication has a demonstrated safety profile (see "Pharmacologic characteristics") and can be used for managing opioid withdrawal or for opioid substitution maintenance therapy.[13]

In northwest Ontario, where an epidemic of OUD has been observed since 2009,[14] rural clinicians are becoming familiar with inducing buprenorphine/naloxone therapy and maintaining patients on this treatment.[14,15] This article reviews the medication and describes induction and maintenance therapy.

OPIOID USE DISORDER

The terminology now used by the American Psychiatric Association is "opioid use disorder," and clear criteria have been established for diagnosis. According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5),[16] OUD "includes signs and symptoms that reflect compulsive, prolonged self-administration of opioid substances that are used for no legitimate medical purpose or, if another medical condition is present that requires opioid treatment, that are used in doses greatly in excess of the amount needed for that medical condition." Specific criteria can be found in DSM-5.[17]

TREAT THE WHOLE PERSON

In almost all cases, the underlying cause for OUD is pain — physical, emotional, spiritual and/or mental. Suffering in any of these realms may be the root cause for a person's initial use of opioids and the subsequent development of OUD. A patient receiving opioid agonist (substitution) therapy will no longer experience the euphoric effects of illicit opioids, thereby losing a key coping mechanism. In addition to opioid agonist therapy, supports (typically called after-care) will be needed to assist the patient in dealing with his or her underlying issues. Although studies differ in their findings regarding the

benefits of psychosocial supportive programs in the treatment of addictions,[18,19] there is general consensus that opioid agonist therapy should be accompanied by psychosocial supportive therapy.[16] Furthermore, fear of withdrawal symptoms can be a powerful driver of ongoing addictive behaviours; buprenorphine/naloxone therapy works well to mitigate those symptoms.

PHARMACOLOGIC CHARACTERISTICS

At first glance it may seem an odd combination: an opioid agonist and an antagonist. The opioid component, buprenorphine, is a semisynthetic opioid derived from the opium poppy that is 40 times more potent than morphine.[13] It binds strongly to the body's opioid receptors (particularly the μ receptor) and acts very much like methadone, by competing with other opioids for access to these receptors. As with methadone, its long half-life provides relief from withdrawal symptoms. Compared to methadone, which is a full μ-opioid receptor agonist, buprenorphine is a partial μ-opioid receptor agonist and has a better safety profile, with minimal respiratory depression and associated morbidity and mortality.[13]

When used as a single component, buprenorphine has limited euphoric effect when administered sublingually, but if administered intravenously, it can become a drug of abuse. When combined with naloxone, the risk of such diversion is decreased, as intravenous use may lead to withdrawal. Naloxone has almost no bioavailability when taken sublingually or orally. Hence the naloxone component of buprenorphine/naloxone allows the buprenorphine component to be safely used as agonist replacement therapy, with a built-in deterrent against diversion to intravenous use.

Precipitated withdrawal at induction must be avoided by ensuring the patient is in some opioid withdrawal. Because of buprenorphine's higher affinity for the μ-opioid receptor, it displaces other opioids from the receptor. Given that most opioids are full agonists, this creates sudden withdrawal symptoms as the expression of full agonist activity is replaced by partial agonist activity.[13] Another disadvantage of this strong receptor binding is that, should the patient require emergency analgesia, much higher dosages of opioids must be used to overcome the buprenorphine that is bound to the receptors.

The safety profile of buprenorphine notwithstanding, concurrent administration of other respiratory depressants such as alcohol, illicit opioids and benzodiazepines should be avoided.

PATIENT ASSESSMENT

A clinical assessment is needed to confirm the diagnosis of OUD, identify concurrent disorders and clarify the patient's treatment goals. Screening blood tests are beneficial for diagnosing bloodborne infections and other health issues in a high-risk population. Investigations should include a pregnancy test, complete blood count, liver function tests, screening for hepatitis B, hepatitis C and HIV infection, a urine drug test and screening for sexually transmitted infections. Useful resources are available through the Centre for Addiction and Mental Health for this initial assessment.[20] Since opioid agonist therapy is a harm-reduction strategy, the patient with OUD must have adequate harmful effects to warrant therapy. It is also important to recognize that chronic pain is a common comorbidity in patients who have opioid addiction. Adjunctive therapies (e.g., anticonvulsives, antidepressants, nonsteroidal anti-inflammatory drugs) may be required to manage pain while the patient is receiving opioid agonist therapy.

STARTING BUPRENORPHINE/ NALOXONE THERAPY

Starting the treatment is typically referred to induction. Induction and maintenance therapy can be given in outpatient settings including the office,[5–10] unsupervised at home[11,12] or as direct observed therapy.[21] Induction instructions are similar in all 3 settings. Provinces have different prescribing requirements (Table 1).

Since buprenorphine/naloxone binds powerfully to opioid receptors, it displaces any illicit opioids present. The patient must therefore be in moderate

Table 1: Provincial and territorial buprenorphine/ naloxone prescribing requirements

Methadone exemption required	No methadone exemption required*
Saskatchewan	British Columbia
Manitoba	Alberta
Newfoundland and Labrador	Ontario
Northwest Territories	Quebec
	New Brunswick
	Nova Scotia
	Prince Edward Island
	Yukon Territory
	Nunavut

*Some jurisdictions require online continuing medical education.

withdrawal before therapy is started. Measuring withdrawal has been standardized by use of the Clinical Opioid Withdrawal Scale (COWS), available online (https://www.naabt.org/documents/COWS_induction_flow_sheet.pdf).[22] Moderate withdrawal is generally identified by a COWS score of 12 or greater.[22] Patients in moderate withdrawal can safely receive induction therapy with buprenorphine/naloxone without great risk of precipitating increased withdrawal symptoms.

USE IN PREGNANCY

There are 3 published articles regarding patients who were incidentally or purposefully exposed to buprenorphine/naloxone prenatally (including induction therapy during pregnancy).[23–25] No adverse outcomes were observed in the total of 71 patients exposed for months to buprenorphine/naloxone.

If buprenorphine/naloxone is diverted to intravenous or intranasal use, however, it can cause severe withdrawal and pose a risk for the fetus.[26] For this reason, current recommendations are that women who become pregnant while taking buprenorphine/naloxone should continue their present treatment but should transition to buprenorphine monotherapy when possible, owing to concerns about withdrawal if buprenorphine/naloxone is used improperly (i.e., injected).[27] Since the single component buprenorphine is available only by special access from the manufacturer, this process can take weeks to set up. The combination drug is available through pharmacies.

PRECIPITATED WITHDRAWAL

Precipitated withdrawal may occur when the first dose of buprenorphine/naloxone is provided to a patient who still has a significant amount of full-agonist opioid occupying the μ-opioid receptors. Precipitated withdrawal differs from the "typical" withdrawal to which patients are accustomed. Precipitated withdrawal has a sudden onset of full withdrawal symptoms within 30 to 60 minutes of the first dose of buprenorphine/naloxone. In addition, it is difficult to reverse because of the high affinity that buprenorphine has for opioid receptors. It is important to prevent precipitated withdrawal by ensuring the patient is in moderate withdrawal before starting buprenorphine/naloxone therapy (it is easier to avoid precipitated withdrawal than to treat it).

Recommended lengths of abstinence before the first dose of buprenorphine/naloxone are listed in Table 2.

Table 2: Recommended length of abstinence before first dose of buprenorphine/naloxone

Drug/route	Length of abstinence
Buprenorphine by any route	None
Methadone by any route	≥ 3–5 d (great individual variance), ideally from a dosage ≤ 30 mg
Other opioids	
Intravenously	≥ 12 hr
Intranasally (snorting), smoking, chewing, orally	≥ 24 hr

WITHDRAWAL SYMPTOMS

Be prepared to manage withdrawal symptoms and common side effects. Patients are typically still experiencing significant withdrawal symptoms for the first 2 days of induction therapy. Some physicians simply provide reassurance and remind patients that their withdrawal will be relieved within a couple of days (most patients have significant improvement by day 3).

Many patients experience at least some transient side effects from buprenorphine/naloxone (e.g., headache, nausea). Table 3 lists the most common side effects. Note that there is some overlap between the symptoms of withdrawal and the side

Table 3: Typical opiate withdrawal signs and symptoms, and common acute buprenorphine/naloxone side effects

Opiate withdrawal signs and symptoms	Buprenorphine/naloxone side effects
Nausea/vomiting	Headache
Diarrhea	Nausea/vomiting
Abdominal cramps	Hyperhidrosis
Diaphoresis	Constipation
"Bone pain" or arthralgia	Insomnia
Myalgia	Unmasking of chronic pain
Fever/chills	Somnolence
Yawning	Euphoria
Rhinorrhea	
Lacrimation	
Piloerection	
Tremors	
Anxiety	
Restlessness	
Irritability	
Insomnia	
Headache	
Fatigue, "feeling lazy"	
Mydriasis	

effects of buprenorphine/naloxone. Most of the side effects are transient and resolve within a few days, except for constipation, hyperhidrosis and any underlying chronic pain.

PROCEDURE

After OUD has been established as a diagnosis, a clinical assessment has been completed and the patient agrees to the treatment plan, induction therapy can be scheduled. The patient must be instructed to abstain from opioids according to the time frames suggested in Table 2; otherwise he or she may risk precipitated withdrawal. The goal of induction therapy is to determine the dosage of buprenorphine/naloxone that relieves symptoms of withdrawal for a full 24 hours, without overmedicating. In the case of office induction, during daily visits for the first 4 to 5 days, assess for signs of drowsiness. Excessive drowsiness may indicate that the dosage is too high and should be decreased by 2 mg (or more). Some mild drowsiness can be expected at first, and the patient should be cautioned against driving or using heavy equipment until this effect resolves, typically within a week.

Day 1

- Ask the patient about his or her last illicit opioid use (when, which opioid, how much and by what route). If the patient has used an opioid within the time frames listed in Table 2, it may be best to delay induction therapy by a few hours.
- Assess the patient's level of opioid withdrawal by using the COWS. A COWS score of 12 or greater is recommended, but lower scores may still be acceptable depending on how long it has been since the patient's last illicit opioid use.
- Buprenorphine/naloxone comes in 2 mg and 8 mg dosages of buprenorphine. The tablets can be divided and are applied under the tongue until dissolved (2–10 min). For most patients, 4 mg is an appropriate first dosage (a smaller dosage may be appropriate for some patients; a larger starting dosage is not recommended). This dosage is provided by direct observed therapy.
- The patient then returns for reassessment at least 3 hours later, at which time, if he or she is still experiencing withdrawal symptoms, another 4 mg dose (or less if appropriate) is given. **The maximum amount given on day 1 is typically 8 mg** (in 2 divided doses). However, a third dose of 4 mg (total 12 mg) can be given 2–3 hours later for certain patients (e.g., those who are pregnant or are at high risk for not completing induction therapy owing to severe withdrawal) to reduce withdrawal symptoms as quickly as possible.

Day 2

- Assess the patient's level of withdrawal. If he or she is still experiencing any withdrawal symptoms, more than the total dosage given on day 1 will be needed. A COWS score of 12 or greater was required only to avoid precipitated withdrawal on day 1; now the goal is to eliminate withdrawal. Typically, 4 mg is added to the previous day's total, but if the previous day's dose lasted almost the full 24 hours, 2 mg may be a more appropriate titration. Hence, the dosage given at the beginning of day 2 is [day 1 total dosage + 4 mg (or 2 mg)].
- If the patient is not experiencing any withdrawal symptoms on day 2, it may be that the total dosage given on day 1 is the appropriate dosage. In that case, the amount given on day 2 is the same as the total dosage that was given on day 1.
- If the patient seems excessively drowsy, the dosage from day 1 may have been too much, and less than the day 1 total dosage should be given.
- Patients can be given the option of returning later in the day for an additional dose if withdrawal symptoms return.
- **The recommended maximum total dosage for day 2 is 16 mg.**

Day 3

- Assessment and dosing continues as described for day 2.
- Typically only 1 dose is provided on day 3 (and beyond).
- **The recommended maximum total dosage for day 3 is 20 mg**.

Day 4

- **The recommended maximum total dosage for day 4 is 24 mg**.

To go above 24 mg of buprenorphine/naloxone is off-label use in Canada. However, some patients may require a higher dosage. In Europe and the US, the maximum dosage is set at 32 mg; beyond

this amount, there is no further benefit owing to the ceiling effect of buprenorphine.

STABILIZATION PHASE

The first 2 to 3 months of buprenorphine/naloxone therapy are referred to as the stabilization phase. The concept of stability in the treatment of opioid addiction generally refers to achievement of many or all of the following goals:

- Discontinuation of injection drug use
- Consistent attendance for direct observed therapy, with very few missed doses
- Improved function in activities of daily living
- Improved quality of life.

It is important to recognize that it is common for patients to still use illicit drugs during the stabilization phase, and some patients will continue to use illicit drugs throughout buprenorphine/naloxone therapy. In these cases, one should remember the overall goals of harm reduction. Abstinence may not be achieved for every patient, so consideration should be given to the benefits of therapy, such as

- Decreased or discontinued injection drug use
- Improved finances
- Improved nutrition
- Ability to maintain employment or to care for children
- Decreased risk of violent altercations
- Improved attendance for routine health care.

The following criteria are helpful in determining a therapeutic dosage for the patient:[16]

- No withdrawal symptoms for the full 24 hours between doses
- Reduced cravings (but cravings may still be present)
- Cessation of opioid abuse
- A slip or relapse to opioid use does not result in euphoria
- No sedation and minimal other side effects.

MAINTENANCE THERAPY AND BEYOND

The overall goal is to reduce harm caused by OUD that affect the individual, the family and the community. These harms include, but are not limited to:

- Transmission of blood-borne infections (e.g., HIV, hepatitis C) and sexually transmitted infections (e.g., hepatitis B, chlamydia, gonorrhea)
- Complications of intravenous drug use (e.g., soft tissue infections, deep vein thrombosis, pulmonary embolus, endocarditis, osteomyelitis, sepsis)
- Financial difficulties (e.g., selling necessary belongings, not buying adequate groceries)
- Prostitution
- Criminal activities, especially break and enter, and theft
- Physical assaults and altercations
- Pregnancy complications (e.g., spontaneous abortion, preterm labour)
- Neonatal abstinence syndrome among infants born to women with OUD
- Children being neglected
- Children being apprehended and placed into care by child protective services
- Poor school attendance by children
- Poor vaccination rates (with resulting risks of outbreaks of vaccine-preventable diseases)
- Suicide and homicide.

One of the primary goals of therapy is to retain the patient in treatment, as dropping out or sudden discontinuation of buprenorphine/naloxone therapy leads to high rates of relapse to opioid abuse. With this in mind, we need to consider the various barriers and events that might increase the risk of attrition.

The maintenance phase is the time to address various issues related to OUD, such as

- Psychiatric comorbidities
- Other drug and alcohol abuse
- Unstable relationships
- Parenting skills, education, employment
- Financial issues
- Health issues.

It is a time for long-term goal setting. Moving beyond OUD and avoiding future relapse requires that the patient has constructed a different life, with healthy coping mechanisms and strong social supports. Often, there is deep emotional trauma from which the patient needs to heal.

Some patients will therefore be in the maintenance phase for life. Others may be able to taper off after several months to a year. The length of maintenance therapy is very individual.

Patients who wish to stop buprenorphine/naloxone therapy should be counseled carefully, as the risk of relapse is very high. They may wish to attend a detoxification program to get through the final withdrawal from buprenorphine/naloxone, or medications for symptom management can be provided by the family physician. Slow tapering over several weeks is recommended.[28] If relapse occurs, the patient should be welcomed back to opioid ago-

nist therapy without judgement. Recovering from relapse may provide lessons and insights that could allow a successful discontinuation later.

Alternative dosing regimens

Once a patient has been maintained on a stable dosage for a period of time, an alternative dosing schedule might be preferred if the patient's dosage is appropriate to allow it. The long half-life of buprenorphine allows the option of longer dosing intervals of up to 2 or even 3 days, as long as the maximum dosage given on any one day does not exceed 24 mg. One caveat of alternative dosing regimens is that managing missed doses can become complicated.[19,29,30]

URINE DRUG SCREENING

The clinical utility of urine drug testing is as follows:

- To assess stability of the patient's condition
- To provide a starting point for discussion of triggers and coping strategies
- To assess for illicit nonopioid drug use and allow for additional treatment planning
- To enable the patient to participate in an incentive program
- To corroborate the patient's self-report of drug use or abstinence
- To detect substances that may be unsafe in combination with buprenorphine/naloxone (e.g., benzodiazepines)
- To document the presence of buprenorphine as a replacement therapy agent.

It is important to note that there is no evidence to support the use of punishment, or the threat of punishment, in the treatment of addictions. This means that buprenorphine/naloxone therapy should not be withheld as a consequence (punishment) for a positive urine drug test result. The fear of being "kicked off" buprenorphine/naloxone creates an unnecessary stress for patients who may still be struggling with drug use. Many patients have intense fear and anxiety regarding opioid withdrawal. Stress and anxiety are common triggers for drug use, and therefore any addiction treatment program should aim to decrease stress in a patient's life and assist with general stress management.

CONCLUSION

Buprenorphine/naloxone combination therapy is a safe and effective outpatient treatment strategy for OUD. Rural physicians can benefit from knowing about it. Even if they decide not to become involved in prescribing it, some of their patients may be taking it, and it is important to understand its pharmacologic characteristics and be comfortable with its use.

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Country cardiograms case 59: Answer

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This article has been peer reviewed.

There is a very slow ventricular rate of 26 per minute. Left bundle branch block is present, with QRS duration of 0.17 seconds. Each QRS complex is preceded by a P wave, with a long (but constant) PR interval of 0.28 seconds. P waves are also noted toward the end of the T waves that follow the QRS complexes. These are not conducted to the ventricles and are followed by a pause. They appear to have similar morphology as the conducted P waves, but it is hard to be certain as they are superimposed on the preceding T waves.

There is therefore a pattern of alternating short and long PP intervals. The short PP intervals measure 0.75 seconds; the long PP intervals measure 1.52 seconds.

There are 2 possible explanations for these observations. The first is sinus bradycardia with atrial bigeminy with blocked premature atrial complexes (PACs). The second involves a combination of sinoatrial (SA) exit block and second-degree atrioventricular (AV) block.

The fact that the long PP intervals are almost exactly double the length of the short PP intervals suggests that SA exit block may be present. In this condition, the sinus impulse is blocked at the SA junction. If this is the case in Figure 1 (page 68), every third P wave is absent, indicating 3:2 SA exit block. (Wenckebach SA exit block should be considered, but typically in this condition the longer PP interval would be less than twice the short PP interval.)

Of the P waves that are evident, every second one is not conducted. If P wave morphology differed from that of the conducted P waves, blocked PACs could be diagnosed with confidence, but in this case one cannot be sure. Second-degree AV block of the 2:1 variety must therefore be considered.

As the left bundle branch block is old, it is not possible to know whether such block would be at the level of the AV node or at the level of the right bundle branch. (If QRS complexes were narrow, the block would be at the level of the AV node, and if the left bundle branch block were new, this might make a block at the bundle branch level more likely.)

Regardless of the precise interpretation details, this patient presented with symptomatic bradycardia, and the absence of a junctional or ventricular escape rhythm is worrisome. Discontinuation of medications that slow conduction in the AV node (in this case, diltiazem) is always a safe first step. However, if blocked PACs are thought to be the cause, suppression of these ectopic beats would be considered, but some of the treatments available might adversely affect AV conduction and therefore precipitate complete heart block. If the SA exit block and second-degree AV block scenario is considered more likely, pacing (or an attempt with atropine) would need to be considered.

Asking the patient whether symptoms increase with exertion might be useful. Cautiously having the patient walk while recording the rhythm on the monitor may help differentiate the level of block or may alter the frequency of PACs, if indeed they are present. Monitoring of symptoms and vital signs will

be essential in deciding whether this patient could be managed locally, allowing time for the effect to occur of stopping diltiazem treatment (with transcutaneous pacing available if urgently required), or whether early referral for transvenous pacing is indicated. Regardless of which decision is made, symptomatic bradycardia should be regarded as a serious and potentially ominous presentation.

One of these explanations involves a single abnormality: blocked PACs. The other involves abnormalities at 2 separate levels: the SA node and the AV node. Isn't the simplest, least complex interpretation (blocked PACs) more likely? Perhaps, based on just 1 tracing, but simply sitting at the bedside, watching the monitor screen and examining further tracings, can provide the answer. In this case, a high-grade second-degree AV block ensued, followed by third-degree AV block, and this patient received a dual-chamber pacemaker on an urgent basis.

SA exit block, although relatively rare, may be a benign vagotonic phenomenon in healthy people. It can also be a marker of more generalized nodal disease, as may have occurred in this case.

For the question, see page 68.

Competing interests: None declared.

Country Cardiograms

Have you encountered a challenging ECG lately?

In most issues of *CJRM* an ECG is presented and questions are asked.

On another page, the case is discussed and the answer is provided.

Please submit cases, including a copy of the ECG, to Suzanne Kingsmill, Managing Editor, *CJRM*, 45 Overlea Blvd., P.O. Box 22015, Toronto ON M4H 1N9; manedcjrm@gmail.com

Cardiogrammes ruraux

Avez-vous eu à décrypter un ECG particulièrement difficile récemment?

Dans la plupart des numéros du *JCMR*, nous présentons un ECG assorti de questions. Les réponses et une discussion du cas sont affichées sur une autre page.

Veuillez présenter les cas, accompagnés d'une copy de l'ECG, à Suzanne Kingsmill, rédactrice administrative, *JCMR*, 45, boul. Overlea, C. P. 22015, Toronto (Ontario) M4H 1N9 ; manedcjrm@gmail.com

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TRANSPORT OF CRITICALLY ILL PATIENTS

We applaud the authors of the article "The impact of transport of critically ill pediatric patients on rural emergency departments in Manitoba"[1] for addressing an important problem facing rural health care: access to specialized care and treatment for critically ill patients and the consequent impact on small rural community staffing. Although the authors focus on pediatric emergency care, this problem is endemic to all delivery of health care services in rural areas.

As the authors suggest in their discussion, one solution involves outreach services, including air and ground transport, from larger referral centres. An example of such a model of ground transport outreach is the High Acuity Response Team (HART) in British Columbia's Interior Health Authority. HART is made up of a critical care transport nurse who has specialty training and equipment and is available 24 hours a day, 7 days a week at each of 4 regional referral centres dispersed across Interior Health, and specialized registered respiratory therapists who are on call to the program and involved in patient transport when needed. The main goal of the HART program is to keep rural nurses and physicians in their communities, rather than having them leave to transport a patient.

HART is deployed from regional "base" hospitals to attend to acute care patients at rural/remote sites and works to either stabilize patients, so they may remain in their community, or, when necessary, transfer them to a site where they can access more complex care. Interfacility transport is carried out in partnership with existing provincial emergency services, which coordinate teams and dispatch vehicles to transport HART to the patient and then the patient on to more definitive care.

When HART is not called to transport, team members are expected to integrate into their base hospital (regional referral centre) by fulfilling a supernumerary clinical support role in the emergency department and intensive care unit under the direction of the hospital's operation manager or site supervisor.

Evaluation of the HART program has shown broad and consistent appreciation by smaller satellite hospitals for the transport services provided.

Beyond the logistics of transport and maintaining adequate staffing, however, we need to respect and support the capacity of small rural emergency departments. This involves recognizing the scope of care that can be provided, with adequate resources and support, in small hospitals. It involves a shift in our thinking from a default position of moving the patient from a small hospital to a larger hospital, to recognizing that some patients can be managed effectively in a small hospital, with the right kind of support. This may involve telehealth linkage and endorsing an expanded scope of practice for rural generalists (i.e., through support for family physicians with enhanced surgical and anesthetic skills), all within effective networks of care.

Jude Kornelsen, PhD
Stefan Grzybowski, MD
Brent Hobbs, RN, BSN, CNCCC

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Spiders on the move

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It's Easter Monday, 6 am. I'm off call, and it's time to take Nathan, the medical student to whom I am a preceptor, into the wilderness. We need the early start before the crust on the snow softens with the heat of the day. Nathan has become adept at "crust skiing" on our daily early-morning ski excursions to Flatbed Falls before work, usually after we have warmed up with 40 lengths in the community swimming pool.

Today's longer trip is a continuation of the plan to sell him on how wonderful being a rural family doctor can be. We head for the wide valley that is the headwaters of Flatbed Creek about 45 minutes from town, and don our cross-country skis. It is amazing how quickly we are in true wilderness. Conditions are idyllic for crust skiing, and soon we have covered 12 km.

I am lapping up the distant mountain scenery, but Nathan is focusing on things nearby. He stops me and asks, "Have you seen the spiders?" I look down, and realize that each little dark brown blob on the snow that I have been skiing past for the last while is a spider, just under an inch long.

Remarkably, these spiders seem to be more or less evenly spaced, about 5 m apart, and they have been present for the past kilometre. The snow-covered floor of the flat valley is about 75 m wide. I do the math: the density seems to be consistent, and that means 3000 spiders! I take a macro photo and watch a spider move painfully slowly in the 1°C temperature.

We follow this up with a quick snowshoe trip to the Shipyard, a favourite mountain destination with its superb rock scenery, and onto the prow of the giant rock outcrop that we know as the Titanic (the most sensational snowshoeing experience on the planet). Then we return to town and post our spider questions to the northern BC naturalist groups, asking if anyone can tell us what phenomenon we have witnessed. A few answers come in: these are probably Wolf spiders, and what we have noted is indeed unusual. Not surprisingly, climate change is offered as an explanation. We are asked by a spider expert in northern British Columbia to return and collect some spider specimens for scientific research.

I manage to deliver Nathan to the medical clinic just in time for the afternoon clinic, where he will work with my colleague in seeing the day's urgent cases. The spiders have made our day, but it is just another one of many superb days in our remote northern community.

I can see that Nathan embraces the concept of longitudinal care and appreciates the rewards and challenges of rural family medicine. He asks me why there aren't hundreds of Canadian doctors lining up to work in places like Tumbler Ridge. My answer is short and to the point: "I don't know. It is one of the great mysteries of existence ... just like the spiders."

Competing interests: None declared.

Instructions for Authors

The *Canadian Journal of Rural Medicine (CJRM)* is a quarterly peer-reviewed journal available in print form and on the Internet. It is the first rural medical journal in the world indexed in Index Medicus, as well as MEDLINE/PubMed databases.

CJRM seeks to promote research into rural health issues, promote the health of rural and remote communities, support and inform rural practitioners, provide a forum for debate and discussion of rural medicine, provide practical clinical information to rural practitioners and influence rural health policy by publishing articles that inform decision-makers.

Material in the following categories will be considered for publication.

Original articles: research studies, case reports and literature reviews of rural medicine (3500 words or less)

Commentary: editorials, regional reviews and opinion pieces (1500 words or less)

Clinical articles: practical articles relevant to rural practice. llustrations and photos are encouraged (2000 words or less)

Off Call articles: a grab-bag of material of general interest to rural doctors (e.g., travel, musings on rural living, essays) (1500 words or less)

Cover: artwork with a rural theme

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Submit an electronic version to manedcjrm@gmail.com. Digital art and photos must accompany the manuscript in separate files (see "Electronic figures and illustrations"). The mailing address, if needed for artwork or other reasons, is as follows: Suzanne Kingsmill, Managing Editor, *CJRM*, P.O. Box 22015, 45 Overlea Blvd., East York ON M4H 1N9. Fax: 416 961-8271. Please do not send anything by courier because they will not deliver to a post office box.

The manuscript should be double-spaced, with a separate title page containing the authors names and titles and a word count, an abstract of no more than 200 words (for original articles category), followed by the text, full references and tables (each table on a separate page). Reference marks should be typed in the text and enclosed by brackets <1> and listed in the order of appearance at the end of the text and not prepared using electronic EndNotes or Footnotes. The approved style guide for the manuscript is the "Uniform requirements for manuscripts submitted to biomedical journals" (see www.cmaj.ca/site/authors/policies.xhtml).

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RM-354

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RM-349

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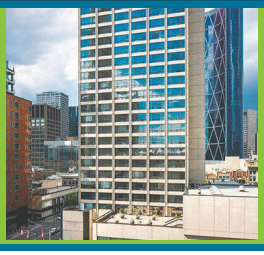
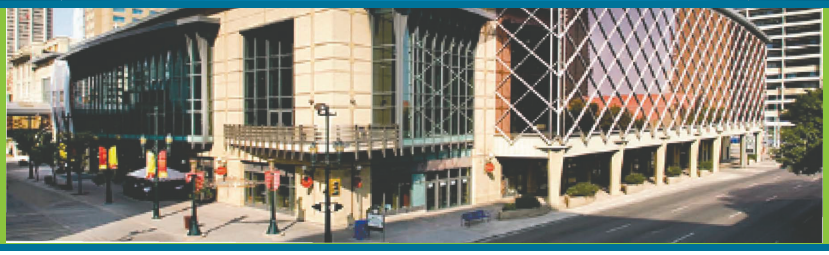


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