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The contribution of Memorial University's medical school to rural physician supply

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Introduction: This study identifies the characteristics and predictors of Memorial University of Newfoundland (MUN) medical graduates working in rural Canada and rural Newfoundland and Labrador (NL).
Methods: We linked data from class lists, the alumni and postgraduate databases with the Southam Medical database to determine 2004 practice locations for MUN graduates from 1973 to 1998 (26 yr, inclusive). Multiple logistic regression was used to identify predictors for each outcome.
Results: In 2004, 167 (12.6%) MUN graduates worked in rural Canada and 81 (6.1%) MUN graduates worked in rural NL. Those who were more likely to practise in rural Canada (when compared with graduates from urban backgrounds, those who had not done any residency training at MUN or specialists, respectively) were graduates from a rural background (odds ratio [OR] 1.95, 95% confidence interval [CI] 1.38–2.76), those who had done residency training at MUN (OR 1.56, 95% CI 1.06–2.29) and family physicians (FPs)–general practitioners (GPs) (OR 6.64, 95% CI 4.31–10.23). Those who were more likely to practise in rural NL (when compared with graduates from urban backgrounds, those who had not done any residency training at MUN, specialists or non-Newfoundlanders, respectively) were graduates from a rural background (OR 2.54, 95% CI 1.57–4.11), those who had done residency training at MUN (OR 4.12, 95% CI 1.94–8.76), FP–GPs (OR 6.39, 95% CI 3.39–12.05) and Newfoundlanders (OR 7.01, 95% CI 2.16–22.71).
Conclusion: The MUN medical school has made a substantial contribution to rural physician supply in both NL and Canada. Increasing the number of local rural students as well as providing incentives to graduates to complete postgraduate training in family medicine in the province may increase the number of locally trained rural physicians.

Introduction : Cette étude décrit les caractéristiques des diplômés en médecine de l'Université Memorial de Terre-Neuve (MUN) qui travaillent dans les régions rurales du Canada et de Terre-Neuve-et-Labrador (NL) et les facteurs qui prédisent qu'ils le feront.
Méthodes : Nous avons relié des données tirées des listes des classes, des bases de données sur les anciens et sur les études de troisième cycle à la Base de données médicales Southam pour déterminer 2004 lieux de pratique de diplômés de la MUN de 1973 à 1998 (26 années inclusivement). Nous avons utilisé une régression logistique multiple pour déterminer les prédicteurs de chaque résultat.
Résultats : En 2004, 167 (12,6 %) diplômés de la MUN travaillaient en milieu rural au Canada et 81 (6,1 %) travaillaient en milieu rural à NL. Ceux qui étaient plus susceptibles de pratiquer en milieu rural au Canada (comparativement aux diplômés de milieux urbains, à ceux qui n'avaient pas fait de résidence à la MUN, ou aux spécialistes respectivement) étaient les diplômés d'origine rurale (coefficient de probabilité [CP] 1,95, intervalle de confiance [IC] à 95 %, 1,38–2,76), ceux qui avaient fait une résidence à la MUN (CP 1,56, IC à 95 %, 1,06–2,29) et les médecins de famille (MF) – omnipraticiens (OP) (CP 6,64, IC à 95 %, 4,31–10,23). Ceux qui étaient plus susceptibles

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de pratiquer en milieu rural à NL (comparativement aux diplômés provenant de milieux urbains, à ceux qui n'avaient pas fait de résidence à la MUN, aux spécialistes ou aux non-Terre-Neuviens respectivement) étaient les diplômés d'origine rurale (CP 2,54, IC à 95 %, 1,57–4,11), ceux qui avaient fait une résidence à la MUN (CP 4,12, IC à 95 %, 1,94–8,76), les OP-MF (CP 6,39, IC à 95 %, 3,39–12,05) et les Terre-Neuviens (CP 7,01, IC à 95 %, 2,16–22,71).

Conclusion : La Faculté de médecine de la MUN a apporté une contribution importante à l'offre des médecins ruraux tant à NL qu'au Canada. L'augmentation du nombre d'étudiants ruraux locaux et l'offre d'incitations aux diplômés pour qu'ils terminent leur formation postdoctorale en médecine familiale dans la province pourraient augmenter le nombre de médecins ruraux formés localement.

Introduction

Canada has traditionally relied on international medical graduates to address shortages in physician supply, particularly in rural and remote communities.[1–3] In 2002/03, international medical graduates made up 23.5% of the physician workforce in Canada; the lowest proportion of international medical graduates were in Quebec, Prince Edward Island and New Brunswick, and the highest in Saskatchewan and Newfoundland and Labrador (NL), where international medical graduates made up 56% and 42%, respectively, of all fee-for-service physicians.[4,5] Compared with other Canadian provinces, NL has a high proportion of provisionally licensed physicians.[6] In 2003, international medical graduates made up about 29% of NL's provisionally licensed physicians and 27% of NL's fully licensed physicians.

Canadian and US studies have reported a substantial variation in the proportion of graduates of different medical schools who practise in rural communities.[7,8] Only 4.2% of University of Toronto graduates practised in rural communities, compared with 22.1% of Université Laval graduates.[7] Among Memorial University of Newfoundland (MUN) graduates, 17.2% practised in rural communities 2 years after completing postgraduate training. This figure rose to 39.4%, the highest in Canada, when only family physicians (FPs) were considered. More recent data from the Canadian Post-MD Education Registry shows that compared with the Canadian average of 13.4%, 41.2% of physicians who completed their FP training in NL were in rural practice.[9] These findings are consistent with other studies that have found that FPs and general practitioners (GPs) are more likely than specialists to work in rural communities.[8]

NL's physician shortage, particularly in rural communities, has been well documented.[10,11] The MUN medical school was established in 1969, in part to alleviate the dependence on other Canadian and international medical schools to meet the need for physicians in NL. Ensuring that medical schools contribute to rural physician supply falls within their mandate to be socially accountable; that is, to "respond to the needs of the community" by directing "education, research and services activities towards addressing priority health concerns."[12]

Despite its reputation for producing rural physicians,[7] it is not known how many MUN medical graduates currently practise in rural communities in NL and in Canada. This article is based on a larger study that examined MUN's contribution to the national, provincial and rural physician workforce. The article identifies the characteristics and predictors of MUN medical graduates working in rural Canada and rural NL. Predictors of MUN medical graduates working in Canada and NL are reported elsewhere.[13]

Methods

Databases

We linked data from the MUN Faculty of Medicine class lists, alumni database and postgraduate database with the 2004 Southam Medical Database. Because the data were not available in electronic linkable format, we linked data using first, last and maiden names, sex, and year and school of graduation since this information was common to each data source. We linked all graduates and residents to the Southam Medical Database and the MUN alumni database to determine current practice locations and status. By using the alumni database in addition to the Southam Medical Database, we were able to increase the number of cases for whom we had complete follow-up data to 98%.

Sample frame

Our sample frame included all MUN graduates from the class of 1973 to the class of 1998 (26 yr). The first year that medical students graduated from MUN was 1973. We selected a cut-off of 1998 to allow sufficient time for graduates to complete their residency training.

Classification of rural and urban

We considered 2 outcomes: working in rural Canada in 2004 and working in rural NL in 2004. Based on work addresses, we classified physicians' work town as rural or urban, based on the 2001 census population.[14] We based our classification on the community population. Rural communities had a population of less than 10 000, while urban communities had a population of 10 000 or more. Each location was coded as rural (1) or urban (0).

Predictors

We examined 8 predictor variables: sex, whether graduates had a rural background, whether graduates came from Canada, whether graduates were from NL, year of graduation, whether they did all or some of their residency at MUN, specialty and age at graduation. Based on their home town reported at the time of admission, we determined whether graduates were from Canada, from NL and from a rural community. Those whose home town had a population of less than 10 000 were considered to have a rural background. We divided year of graduation into 3 groups: the 1970s (1973–1979), 1980s (1980–1989) and 1990s (1990–1998). Specialty was based on the physicians' certified specialization as recorded in the Southam Medical Database or MUN alumni database. We categorized each physician as either an FP–GP or a specialist.

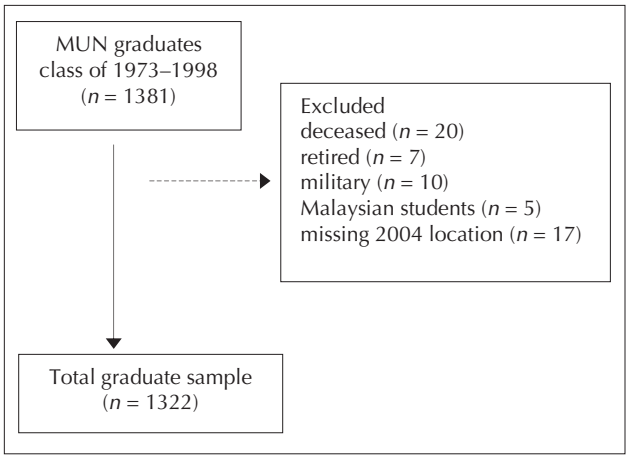


Fig. 1. Construction of the study sample. MUN = Memorial University of Newfoundland.

Analysis

Analyses were performed with SPSS 12.0 (SPSS Inc., Chicago, Illinois). For each objective, we used frequencies, and means and standard deviations (SDs) to describe the characteristics of the sample. Chi-squared tests and analysis of variance (ANOVA) were used to identify differences between each of the outcome and predictor variables. Multiple logistic regression was used to identify significant ($p < 0.05$) predictors for each dependent variable. Potential predictors for each regression model were selected on the basis of the bivariate analyses.

Table 1. Characteristics of Memorial University of Newfoundland medical school graduates, 1973–1998 (*n* = 1322)

Characteristic	No. (and %) of graduates*
Sex	
Male	771 (58.5)
Female	546 (41.5)
Have a rural background	
No	897 (69.1)
Yes	402 (30.9)
From Canada	
No	23 (1.7)
Yes	1298 (98.3)
From Newfoundland and Labrador	
No	335 (25.4)
Yes	986 (74.6)
Year of graduation	
1973–1979	310 (23.4)
1980–1989	525 (39.7)
1990–1998	487 (46.8)
Did some or all of residency at MUN	
No	494 (37.4)
Yes	828 (62.6)
Specialty	
Specialist	703 (53.2)
Family physician–general practitioner	619 (46.8)
Mean age (and SD) at graduation, yr	26.6 (3.3)
Practising in rural Canada in 2004	
No	1155 (87.4)
Yes	167 (12.6)
Practising in rural Newfoundland and Labrador in 2004	
No	1241 (93.9)
Yes	81 (6.1)

MUN = Memorial University of Newfoundland; SD = standard deviation.
*Unless otherwise indicated.

To test the robustness of our findings, we repeated the analyses using community census agglomeration population. The census agglomeration accounts for proximity of suburban communities to large urban centres, degree of integration and commuting patterns.[15,16]

The Human Investigations Committee, Faculty of Medicine, MUN, approved this study.

Results

From the 1381 physicians who graduated between 1973 and 1998, we excluded deceased, retired and military physicians as well as graduates who were sponsored by the Malaysian government and required to return to Malaysia after completing their training (Fig. 1). We also excluded an additional 17 graduates from the analysis because we were unable to determine where they were working in 2004, leaving a total of 1322 graduates. We had the 2004 practice location of 98% of otherwise eligible graduates.

The majority of MUN medical graduates in our study were male, did not have a rural background, were from Canada and NL, and did at least some part of their postgraduate residency training at MUN (Table 1). The largest proportion of physicians who graduated from the MUN medical school during the 1980s were FP–GPs.

Table 2 summarizes the characteristics of MUN graduates who were working inside and outside a

Table 3. Predictors of Memorial University of Newfoundland graduates who work in rural communities in Canada

Variable	OR (95% CI)
Have a rural background	
No	1.00
Yes	1.95 (1.38–2.76)
Did some or all of residency at MUN	
No	1.00
Yes	1.56 (1.06–2.29)
Specialty	
Specialist	1.00
Family physician–general practitioner	6.64 (4.31–10.23)

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

Table 2. Characteristics of Memorial University of Newfoundland graduates working inside and outside Canadian rural communities

	No. (and %) of graduates by practice location*		
Characteristic	Outside rural Canada	Inside rural Canada	*p* value
Sex			0.84
Male	672 (58.4)	99 (59.3)	
Female	478 (41.6)	68 (40.7)	
Have a rural background			< 0.001
No	812 (71.7)	85 (51.2)	
Yes	321 (28.3)	81 (48.8)	
From Canada			0.07
No	23 (2.0)	0 (0.0)	
Yes	1131 (98.0)	167 (100.0)	
From Newfoundland and Labrador			0.66
No	295 (25.6)	40 (24.0)	
Yes	859 (74.4)	127 (76.0)	
Year of graduation			0.03
1973–1979	270 (23.4)	40 (24.)	
1980–1989	472 (41.)	52 (31.3)	
1990–1998	412 (35.7)	75 (44.9)	
Did some or all of residency at MUN			< 0.001
No	451 (39.0)	43 (25.7)	
Yes	704 (61.0)	124 (74.3)	
Specialty			< 0.001
Specialist	675 (58.4)	28 (16.8)	
Family physician–general practitioner	480 (41.6)	139 (83.2)	
Mean age (and SD) at graduation, yr	26.5 (3.4)	26.7 (3.3)	0.44

MUN = Memorial University of Newfoundland; SD = standard deviation.
*Unless otherwise indicated.

rural community in Canada. Compared with physicians working outside a rural community in Canada, a larger proportion of rural physicians had a rural background, graduated in the 1990s and did all or some of their residency training at MUN. A larger proportion of rural physicians were FP–GPs, compared with their counterparts working outside rural Canada. There were no differences between these physicians in terms of sex, whether they came from Canada or NL, or their age at graduation. Table 3 presents the predictors for the outcome working in rural Canada.

In 2004, 81 (6.2%) of MUN graduates were working in a rural community (population > 10 000) in NL. A larger proportion of rural NL physicians than physicians working elsewhere had a rural background, were from NL, had graduated in the 1990s, and did all or some of their residency training at MUN (Table 4). A larger proportion of rural physicians were FP–GPs, compared with their counterparts working elsewhere. There were no differences among these physicians in terms of sex, whether they came from Canada (as a whole) or their age at graduation.

Of the 276 students with a rural background who did some or all of their residency training at

Table 5. Predictors of Memorial University of Newfoundland graduates who work in rural Newfoundland and Labrador

Variable	OR (95% CI)
Have a rural background	
No	1.00
Yes	2.54 (1.57–4.11)
From Newfoundland and Labrador	
No	1.00
Yes	7.01 (2.16–22.71)
Did some or all of residency at MUN	
No	1.00
Yes	4.12 (1.94–8.76)
Specialty	
Specialist	1.00
Family physician–general practitioner	6.39 (3.39–12.05)

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

Table 4. Characteristics of Memorial University of Newfoundland graduates who work inside and outside rural communities in Newfoundland and Labrador

	No. (and %) of graduates by practice location*		
Characteristic	Outside rural NL	Inside rural NL	*p* value
Sex			0.13
Male	717 (58.0)	54 (66.7)	
Female	519 (42.0)	27 (33.3)	
Have a rural background			< 0.001
No	864 (70.9)	33 (40.7)	
Yes	354 (29.1)	48 (59.3)	
From Canada			0.22
No	23 (1.9)	0 (0.0)	
Yes	1217 (98.1)	81 (100.0)	
From Newfoundland and Labrador			< 0.001
No	332 (26.8)	3 (3.7)	
Yes	908 (73.2)	78 (96.3)	
Year of graduation			< 0.001
1973–1979	284 (22.9)	26 (32.1)	
1980–1989	507 (40.9)	18 (22.2)	
1990–1998	450 (36.3)	37 (45.7)	
Did some or all of residency at MUN			< 0.001
No	486 (39.2)	8 (9.9)	
Yes	755 (60.8)	73 (90.1)	
Specialty			< 0.001
Specialist	691 (55.7)	12 (14.8)	
Family physician–general practitioner	550 (44.3)	69 (85.2)	
Mean age (and SD) at graduation, yr	26.6 (3.4)	26.4 (3.2)	0.65

NL = Newfoundland and Labrador; MUN = Memorial University of Newfoundland; SD = standard deviation.
*Unless otherwise indicated.

MUN, 43 (15.6%) were working in rural NL. Table 5 presents the predictors for the outcome of working in rural NL.

Our sensitivity analyses using community census agglomeration populations found similar results (data not shown but available on request).

Discussion

In 2004, 167 (12.6%) MUN graduates worked in rural Canada, making up about 4.9% of the rural physicians in Canada.[17] Eighty-one (6.1%) MUN graduates worked in NL, making up roughly 20.8% of the rural physicians in the province.[17]

Consistent with other studies, we found that FPs and graduates who had a rural background were more likely to work in rural communities.[18–22] This supports initiatives that encourage rural students to pursue medical careers and policies that increase the number of rural students admitted to medical school to increase the number of rural physicians.[23–25]

It is not surprising that FPs are more likely than specialists to work in rural areas given that the infrastructure and population required to support most specialties are not present in small communities and rural areas. Therefore, the very act of choosing neurosurgery eliminates many physicians from the possibility of locating in rural Canada. When we limited our analysis only to FPs and GPs, we found that graduates who had a rural background were more likely (odds ratio [OR] 2.52, 95% confidence interval [CI] 1.72–3.71) to work in rural Canada, while those with a rural background (OR 3.08, 95% CI 1.79–5.29), from NL (OR 5.90, 95% CI 1.80–19.36) and who did some or all of their residency at MUN (OR 4.61, 95% CI 1.93–11.01) were more likely than their counterparts to work in rural NL.

Completing all or some portion of postgraduate training at MUN was also a strong predictor of rural practice. Providing incentives for graduates to complete their postgraduate training in their home province may increase provincial retention of graduates. Residency programs that emphasize rural training are associated with rural practice.[7,18,19,24–28] The MUN residency program, particularly in family medicine, includes a strong rural component.[29] Other studies have noted that exposure to rural medicine is important, not only to build skills for rural practice, but also to expose residents to the realities of rural living.[19,28,30] Chan and colleagues,[31] in a recent Canadian study of rural FPs, noted that rural medical education is particularly influential for medical trainees with urban backgrounds. Rourke and colleagues[22] reported that undergraduate rural medical education and postgraduate rural training were independent predictors of rural practice for both rural and urban students. Like these 2 studies, we found that a large proportion of MUN graduates practising in rural communities came from urban backgrounds (51% of those in rural Canada and 40.7% of those in rural NL).

In addition to these 3 predictors, being from NL was a predictor of rural practice in NL. All but 3 of the MUN graduates working in rural NL had come from NL. These findings support policies in Canadian medical schools that give priority for admission to students from the province in which the school is located. For MUN, this suggest that the number of seats reserved for NL students should be at least maintained if not increased.

Whether sex influences choice of rural practice is unresolved in the literature. Although earlier and US studies have reported that women are less likely to practise in rural areas,[8,26] more recent studies of Canadian physicians suggest no sex differences in the likelihood to practise in rural communities.[7,20,32,33] We did not find a significant difference between sex and choice of rural practice (in either Canada or NL). Given the increasing number of women in medical school in Canada and who practise family medicine,[34] further research is needed to better understand the impact of the feminization of the medical workforce on rural physician supply.

Study limitations

The cross-sectional design allowed us to consider physician practice location in the year 2004 only. We do not know whether physicians remained in 1 location for their entire career or if they returned after an absence. As a result we did not include physicians who worked in rural communities in Canada or NL before 2004, thereby underestimating MUN's contribution to the national and provincial rural physician workforce, as many physicians will work in rural practice for some or many years before relocating to urban practice. It is difficult to estimate the contribution of MUN medical graduates to the rural workforce in person years without knowing what proportion of each class practised in rural areas and for how long. Our current research is examining these issues. For example, among FPs and GPs who were licensed in the province for the first time between 1997 and 2000, MUN graduates

remained in the province significantly longer (on average 39 mo) than other Canadian medical graduates or international medical graduates (both 22 mo).[35] However, the study sample was not limited to rural physicians.

Conclusion

The MUN medical school has made a substantial contribution to the rural physician supply, particularly in NL and the rest of Canada. In the 26 graduated years between 1973 and 1998, the MUN medical school has trained 1981 physicians; in 2004, 12.6% were working in rural communities in Canada, 6.1% in NL. Of the 144 FPs from rural NL who had done some or all of their family residency training at MUN, 38 (26.4%) were working in rural NL. Increasing the number of local rural students as well as providing incentives to graduates to complete postgraduate training in family medicine in the province may increase the number of locally trained rural physicians.

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References

1. Andrew R, Bates J. Program for licensure for international medical graduates in British Columbia: 7 years' experience. *CMAJ* 2000;162: 801-3.
2. Nasmith L. Licence requirements for international medical graduates: Should national standards be adopted. *CMAJ* 2000;162:795-6.
3. Barer ML, Stoddart GL. Toward integrated medical resources policies for Canada: 4. Graduates of foreign medical schools. *CMAJ* 1992;146:1549-54.
4. Canadian Institute for Health Information. *The practicing physician community in Canada 1989/90 — 1998/99: workforce and workload as gleaned through billing profiles for physician services.* Ottawa (ON): The Institute; 2001.
5. Canadian Institute for Health Information. *Full-time equivalent physicians report, Canada 2002-2003.* Ottawa (ON): The Institute; 2004.
6. Audas R, Ross A, Vardy D. The use of provisionally licensed international medical graduates in Canada. *CMAJ* 2005;173:1315-6.
7. Hutten-Czapski P, Thurber AD. Who makes Canada's rural doctors? *Can J Rural Med* 2002;7:95-100.
8. Rosenblatt RA, Whitcomb M.E, Cullen TJ, et al. Which medical schools produce rural physicians? *JAMA* 1992;268:1559-65.
9. Canadian post-MD education registry. *New family physicians in rural practice*. 2004. Available: www.caper.ca/docs/pdf_2004_jan_09 _forum_rural_practice.pdf (accessed 2007 Nov 9).
10. Talbot Y, Fuller-Thomson E, Tudiver F, et al. Canadians without regular medical doctors, Who are they? *Can Fam Physician* 2001;46:58-64.
11. Mathews M, Edwards AC. Having a regular physician: urban–rural differences in Newfoundland. *Can J Rural Med* 2004;9:166-72.
12. Health Canada. *Social accountability — a vision for Canadian medical schools*. Ottawa (ON): Health Canada. 2001. p. 1.
13. Mathews M, Rourke JTB, Park AD. National and provincial retention of medical graduates of Memorial University. *CMAJ* 2006;175: 357-60.
14. Statistics Canada. Community profiles. Available: www12.statcan.ca /english/profil01/PlaceSearchForm1.cfm (accessed 2007 Nov 9)
15. Statistics Canada. *Postal code conversion file (PCCF), reference guide, December 2003*. Ottawa (ON): Statistics Canada; 2004.
16. Statistics Canada. *Geographic units: Census Metropolitan Areas (CMA) and Census Agglomeration (CA)*. Available: www12.statcan.ca/english /census01/Products/Reference/dict/geo009.htm (accessed 2007 Nov 15)
17. MD Select. *2004 National MD select* [database]. Toronto (ON): Business Information Group; 2004.
18. Bible BL. Physicians' views of medical practice in nonmetropolitan communities. *Public Health Rep* 1970;85:11-7.
19. Brooks RG, Walsh M, Mardon RE, et al. The roles of nature and urture in the recruitment and retention of primary care physicians in rural areas: a review of the literature. *Acad Med* 2002;77:790-8.
20. Easterbrook M, Godwin M, Wilson R, et al. Rural background and clinical rural rotations during medical training: effect on practice location. *CMAJ* 1999;160:1159-63.
21. Johnson SE, Baeumler WL, Carter RE. The family physicians: a comparative study of Minnesota and Wisconsin family physicians practicing in rural and urban communities. *Minn Med* 1973;713-8.
22. Rourke JTB, Incitti F, Rourke LL, et al. Relationship between practice location of Ontario family physicians and their rural background or amount of rural medical education experience. *Can J Rural Med* 2005;10:231-9.
23. Rourke J; Task Force of the Society of Rural Physicians of Canada. Strategies to increase the enrolment of students of rural origin in medical school: recommendation from the Society of Rural Physicians of Canada. *CMAJ* 2005;172:62-5.
24. Tesson G, Curran V, Pong R, et al. Advances in rural medical education in three countries: Canada, the United States and Australia. *Educ Health (Abingdon)* 2005;18:405-15.
25. Curran V, Rourke J. The role of medical education in the recruitment and retention of rural physicians. *Med Teach* 2004;26:265-72.
26. Carter RG. The relation between personal characteristics of physicians and practice location in Manitoba. *CMAJ* 1987;136:366-8.
27. Costa AJ, Labuda Schrop S, McCord G, et al. To stay or not to stay: factors influencing family practice residents' choice of initial practice location. *Fam Med* 1996;28:214-9.
28. Rourke JT. Politics of rural health care: recruitment and retention of physicians. *CMAJ* 1993;148:1281-4.
29. Jong MKK, Beach DA. NORFAM: training residents for rural practice. *Can J Rural Med* 1997;2:120.
30. Whiteside C, Mathias R. Training for rural practice. Are graduates of a UBC program well prepared? *Can Fam Physician* 1996;42:1113-21.
31. Chan BTB, Degani N, Crichton T, et al. Factors influencing family physicians to enter rural practice. *Can Fam Physician* 2005;51:1246-7.
32. Szafran O, Crutcher RA, Chaytors RG. Location of family medicine graduates' practices. What factors influence Albertan's choices? [electronic version]. *Can Fam Physician* 2001;47:2279-85.
33. Incitti F, Rourke J, Rourke LL, et al. Rural women family physicians — Are they unique? *Can Fam Physician* 2003;49:320-7.
34. Canadian Institute for Health Information. *Supply, distribution and migration of Canadian physicians 2004*. Ottawa (ON): The Institute; 2005.
35. Mathews M, Edwards AC, Rourke JTB. Retention of provisionally licensed international medical graduates: a historical cohort study of general and family physicians in Newfoundland and Labrador. *Open Medicine*. In press.