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How underserviced rural communities approach physician recruitment: changes following the opening of a socially accountable medical school in northern Ontario

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Introduction: The Northern Ontario School of Medicine (NOSM) opened in 2005 with a social accountability mandate to address a long history of physician shortages in northern Ontario. The objective of this qualitative study was to understand the school's effect on recruitment of family physicians into medically underserviced rural communities of northern Ontario.

Methods: We conducted a multiple case study of 8 small rural communities in northern Ontario that were considered medically underserviced by the provincial ministry of health and had successfully recruited NOSM-trained physicians. We interviewed 10 people responsible for physician recruitment in these communities. Interview transcripts were analyzed by means of an inductive and iterative thematic method.

Results: All 8 communities were NOSM medical education sites with populations of 1600–16 000. Positive changes, linked to collaboration with NOSM, included achieving a full complement of physicians in 5 communities with previous chronic shortages of 30%–50% of the physician supply, substantial reduction in recruitment expenditures, decreased reliance on locums and a shift from crisis management to long-term planning in recruitment activities. The magnitude of positive changes varied across communities, with individual leadership and communities' active engagement being key factors in successful physician recruitment.

Conclusion: Locating medical education sites in underserviced rural communities in northern Ontario and engaging these communities in training rural physicians showed great potential to improve the ability of small rural communities to recruit family physicians and alleviate physician shortages in the region.

Introduction : L'École de médecine du Nord de l'Ontario (EMNO), qui a ouvert ses portes en 2005, a pour mandat social de combler la pénurie d'effectifs médicaux qui sévit depuis longtemps dans le Nord de l'Ontario. L'objectif de cette étude qualitative était d'étudier l'effet qu'a eu l'école sur le recrutement des médecins de famille dans des communautés rurales mal desservies dans cette région de la province.

Méthodes : Nous avons procédé à une étude de cas multiples auprès de 8 petites communautés rurales du Nord de l'Ontario considérées comme mal desservies par le ministère de la Santé provincial sur le plan des effectifs médicaux et ayant réussi à recruter des médecins formés à l'EMNO. Nous avons interrogé 10 personnes responsables du recrutement des médecins dans ces communautés. La transcription des entrevues a été analysée au moyen d'une méthode thématique inductive et itérative.

Résultats : La formation médicale de l'EMNO était offerte dans les 8 communautés, dont la population variait de 1600 à 16 000 habitants. Parmi les améliorations reliées à la collaboration avec l'EMNO, mentionnons : le recrutement de médecins dans 5 communautés où sévissaient auparavant des pénuries chroniques de l'ordre de 30 % à 50 %, une réduction substantielle des dépenses liées au recrutement, une diminution

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du recours à des remplaçants et la transition des activités de recrutement pour passer d'une situation de gestion de crise à une situation de planification à long terme. L'ampleur des améliorations a varié selon les communautés; le leadership individuel et la participation active des communautés ont été des facteurs clés de la réussite du recrutement des médecins.

Conclusion : La prestation d'une formation dans de petites communautés rurales mal desservies du Nord de l'Ontario et la mobilisation des communautés visées à l'endroit de la formation des médecins en milieu rural ont révélé leur fort potentiel d'amélioration de la capacité de recruter des médecins de famille et de corriger les pénuries d'effectifs médicaux dans la région.

INTRODUCTION

There is a persistent shortage of physicians in northern Ontario,[1–3] a vast area of roughly 800 000 km^2 with a scattered population of about 800 000.[4] As one of several Ontario government strategies designed to improve access to health care in northern areas,[5] the Northern Ontario School of Medicine (NOSM) opened in 2005, with a social accountability mandate to be responsive to the "needs of the people and communities of the region with a focus on improving their health."[6] NOSM's commitment to social accountability starts with preadmission programs and continues with selection of students who are representative of northern Ontario with respect to rural, northern, Indigenous or francophone backgrounds. NOSM facilitates medical education, accepting 64 undergraduate and about 60 postgraduate[7] learners each year, as well as the education of other health care professionals (e.g., dietitians, physician assistants and therapists) in over 90 communities located primarily in northern Ontario.[8]

NOSM undergraduate students spend a mandatory 4 weeks in Indigenous communities at the end of their first year and two 4-week placements in small (< 5000 people) rural and remote communities during their second year. The full 8 months of the third year is spent in 1 of 15 small urban or large rural communities (5000–70 000 people). Students may also take rural electives in their fourth year. NOSM postgraduate residents spend 3–9 months per year in small cities and small or large towns, with family medicine residents in the rural stream spending the most time in these small northern Ontario communities.[8] With individual communities hosting NOSM learners for 1–9 months, the communities' active contributions to learning are a key feature of NOSM's distributed community-engaged learning model, consistent with the school's social accountability mandate.[8]

The first 3 cohorts of family physicians (n = 131), who completed undergraduate (n = 49), postgraduate (n = 31) or both (n = 51) medical education programs at NOSM, started full practice in 2011–2013. In 2014, 79 (60.3%) of these physicians had set up practice in northern Ontario, with 21 (16.0%) in rural communities.[9] Based on research that documented the potential benefits of rural medical education to physician recruitment into rural communities,[10–16] and with earlier assessment of NOSM's socioeconomic impact on rural communities,[17] it was expected that the presence of NOSM in the region would help to alleviate physician shortages in northern Ontario. In this qualitative study, we investigated NOSM's impact on physician recruitment in selected medically underserviced rural communities of northern Ontario using first-hand accounts of people responsible for physician recruitment.

METHODS

We used a multiple case study design.[18] We chose communities that 1) were rural and medically underserviced, based on the Rurality Index for Ontario used by the Ministry of Health and Long-Term Care to determine eligibility for the Underserviced Area Program,[19] and 2) had recruited NOSM graduates as family physicians.

We identified people responsible for physician recruitment in selected communities, contacted them by telephone to introduce our study and asked their permission to send out a study package, including an invitation letter signed by the NOSM's dean, a consent form and an interview guide. No participation incentives were offered. Key informants were interviewed by telephone in the fall of 2014.

The semistructured interviews contained questions about the interviewees' role in the community's physician recruitment process, past and current physician recruitment activities in the community, and the interviewees' experience of collaboration with NOSM. Interviews were conducted by a team of 2 or 3 researchers and lasted about 30 (range 20–50) minutes. In addition to answering the structured questions, participants were invited to elaborate on points that interviewers thought to be unclear or particularly relevant for the study. After each inter-

view, researchers had a brief discussion of the interview and of any questions regarding interpretation.

All interviews were recorded and transcribed verbatim by professional transcribers. The transcripts were reviewed by 2 researchers for accuracy and were uploaded to NVivo 10 for Windows (QSR International), which was used for coding transcripts and applying an inductive and iterative thematic analytic method.[20] Most of the themes were predefined by the structured interview questions. Other common themes were identified by the comparison-and-contrasting method. The cross-case data synthesis examined differences and similarities between the communities.[21] Key informants were contacted to verify their responses and to obtain permission to use quotes.

Ethics approval

Laurentian University's Research Ethics Board granted ethical approval.

RESULTS

Communities and key informants

Twelve communities in northern Ontario met our case definition at the time of the study (fall 2014): Bracebridge, Chapleau, Dryden, Elliott Lake, Espanola, Hearst, Kenora, Little Current, Marathon, New Liskeard, Nipigon and Sioux Lookout (Fig. 1). Fifteen potential interviewees were identified who were responsible for physician recruitment in the 12 communities. Of the 15, 3 did not answer the telephone or respond to our voice messages (up to 3 attempts were made), and 2 received the study invitation but did not return a consent to participate in the study. The remaining 10 people consented to participate in the study as key informants and were interviewed.

Four key informants were employed as physician recruiters; 2 of the 4 also worked as NOSM site administrative coordinators for the educational programs in their community. The other 6 key informants were senior executives or managers at local hospitals, family health teams or physician groups and were responsible for physician recruitment in their organizations. Key informants had worked in their positions for 1.5–16 years.

The key informants represented 8 communities with populations ranging from 1600 to 16 000 people, located 70–600 km from the major cities of Sudbury or Thunder Bay, and serving catchment areas with populations up to 35 000 (as estimated by key informants) (Fig. 1). Five communities were located 300 km or more from either Sudbury or Thunder Bay. One community had a predominantly francophone population, and another had a substantial proportion of Indigenous people. All communities were NOSM education sites, accommodating 3–6 undergraduate and postgraduate placements with at least 2 learners per placement.[22,23]

Changes to physician recruitment

Fewer physician shortages

According to key informants, 6 of 8 communities had experienced a shortage of family physicians in the previous 5–10 years that ranged from 30% to 50% of the required supply. At the time of the study, 5 had achieved a full or almost full complement of family doctors. In these communities, based on key informants' estimates, the need for family physicians decreased from about 30 full-time physician vacancies to only 1 full-time physician vacancy. Dependency on locum doctors was also reported to have declined. Key informants expressed relief from the chronic stress of physician shortages:

> It's nice to be out of crisis mode. (KI-1)

> So we're at a point now of almost turning people away because we're getting full. I'm not out beating the ground anymore. It's a little more relaxing right now. (KI-2)

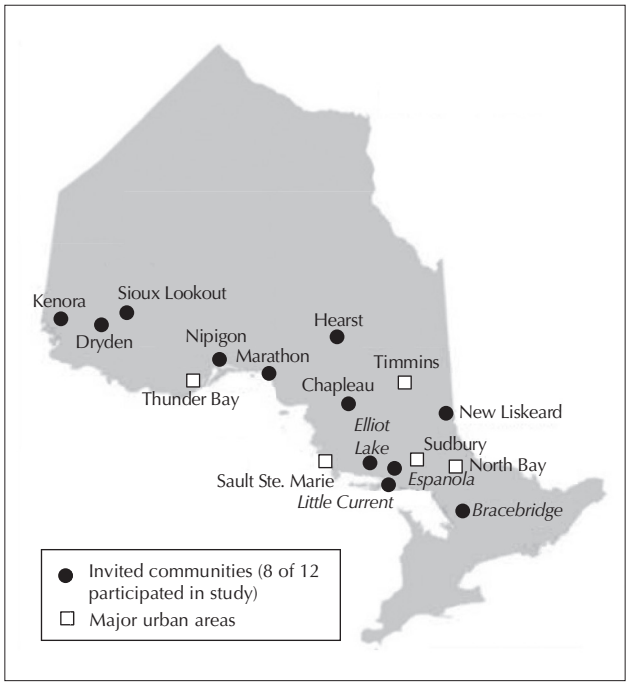


Fig. 1. Northern Ontario communities selected for invitation to the study.

One community, however, continued to struggle with the physician shortage, needing to fill about 30% of the positions and still relying heavily on locum doctors. The remaining 2 communities had not had problems with physician shortages in the past, but key informants reported that this problem could arise with future retirements of their permanent doctors.

New recruitment strategies

NOSM's presence in the communities and the region changed communities' reliance on traditional recruitment strategies (Table 1). Key informants agreed that NOSM graduates who were exposed to rural and northern communities during their undergraduate or postgraduate training were easier to recruit than physicians who trained in southern Ontario or internationally. Regardless of how physician recruitment was organized within communities, key informants recognized NOSM as a major source for new physicians. As 1 key informant noted:

> Most of our new doctors in the community are associated with NOSM. So for us, it's probably the single biggest source of current and future doctors. (KI-2)

Table 1: Changes in physician recruitment strategies in 8 communities

Previous 5–10 yr	Current
Attended conferences (e.g., Family Medicine Forum, Society of Rural Physicians, HealthForceOntario, Professional Association of Residents of Ontario)	Visiting medical schools, including NOSM
Attended job fairs/conferences (travelled "all over the place"), used financial incentives, recruited international medical graduates	Focusing on NOSM learners, involving less travel and fewer financial incentives
Attended job fairs/conferences (recruited mostly locums)	Focusing on NOSM learners
Attended job fairs/conferences	Focusing on NOSM learners, accommodating interests and practice styles of new physicians, using financial incentives
Attended job fairs/conferences	Community funding, hiring physician recruiter to work with NOSM
Recruitment done by physicians, not supported by community	Having physician recruiter paid by physicians, collaborating with NOSM
Attended HealthForceOntario recruitment tours	Investing in material infrastructure, collaborating with NOSM
Attended HealthForceOntario recruitment tours and recruitment job fairs (recruited mostly locums)	Being involved with medical schools, including NOSM

NOSM = Northern Ontario School of Medicine.

Four communities hosted NOSM's 8-month Community Comprehensive Clerkship (longitudinal integrated clerkship for the third-year students). One key informant explained how a prolonged stay of medical learners in the community facilitates recruitment:

> [NOSM] students live here for 8 months, so in the long run, after their fourth year and 2 years' residence, if they want to settle somewhere, well, they have stayed here for 8 months so they know the role, they know the activities, they know the communities, so it's a big investment in recruiting, being a Comprehensive Community Clerkship community. (KI-3)

Hiring NOSM graduates who were raised in the communities was a common practice:

> We've had a couple of local kids go through the NOSM program and come back here. We currently have 2 [Comprehensive Community Clerkships], third-year clerks who are local kids. That's really important. Half a dozen local kids are [now] in the NOSM stream. And that's part of our longer-term planning. (KI-2)

Key informants from communities that achieved a full complement of physicians noted a shift in recruitment focus. For example, 6 communities were expecting more than half of their physicians to retire in the next 3–7 years, and, thus, the need for succession planning emerged. Beyond the numbers, key informants identified a need for physicians with certain skills:

> We need to recruit more physicians [who] will, as part of their practice, go to First Nations communities. (KI-4)

> We have trouble recruiting a general surgeon. I'm honest with you that the new graduating surgeons don't fit the rural model. (KI-5)

Some informants also identified the need for physician retention but were not as far along in this regard as they would have liked.

Decreased recruitment expenditures

Annual recruitment budgets estimated by key informants ranged from $4000 to more than $200 000. These budgets paid for recruitment trips, physician incentives and, in some communities, the salary of the physician recruiter. Funding sources for recruitment activities included large-scale fundraising events, fixed portions of hospitals' and other health care organizations' budgets, and local physicians' "out-of-pocket" support.

According to key informants, trips to job fairs in larger urban areas of southern Ontario were costly

and tended to recruit locum physicians rather than permanent doctors. Travel to job fairs and associated costs decreased in communities that were successful in recruiting NOSM graduates as family physicians.

Physician incentives included return-of-service payments, housing and lifestyle inducements such as free memberships to local recreational facilities. Communities differed in their ability and approach to using physician incentives. For example, some communities' budgets were too small for return-of-service contracts; other communities, in the words of the key informants, were explicitly opposed to cash incentives and invested resources exclusively into building new or upgrading existing physician clinics. Having NOSM as a new source for physician recruitment permitted communities to decrease financial incentives offered to doctors. In the words of 1 key informant:

> We've pared that down, I guess, to reflect our decreasing desperation. And it's gone from $200 000 to $100 000 to $80 000, and we've pared it down to $50 [thousand for 4 years]. (KI-1)

Varying benefits from presence of NOSM

Physician recruitment outcomes varied across communities (Fig. 2). On one side of the continuum were the more successful communities, those that were "making strides." These communities had achieved the full complement of family physicians and were in a synergistic relation with NOSM that encompassed medical education and physician recruitment. In the words of 1 key informant:

> Initially, we did not see a lot of resident traffic here. But, certainly, we've made strides to raise the profile of our community [at NOSM]. We participate in the interview process; we provide staff that go down there for a weekend and sit in on both days of the interview for the incoming class. … And then we've got some [NOSM] faculty members who are involved with the postgrad curriculum and deliver a lot of learning and training sessions. We've appointed a designate to sit on the strategic planning committee for NOSM for 2015–2020. We proctor exams here. (KI-1)

On the other side of the continuum were the communities that continued to deal with physician shortages. NOSM's impact on these communities was not perceived as substantial:

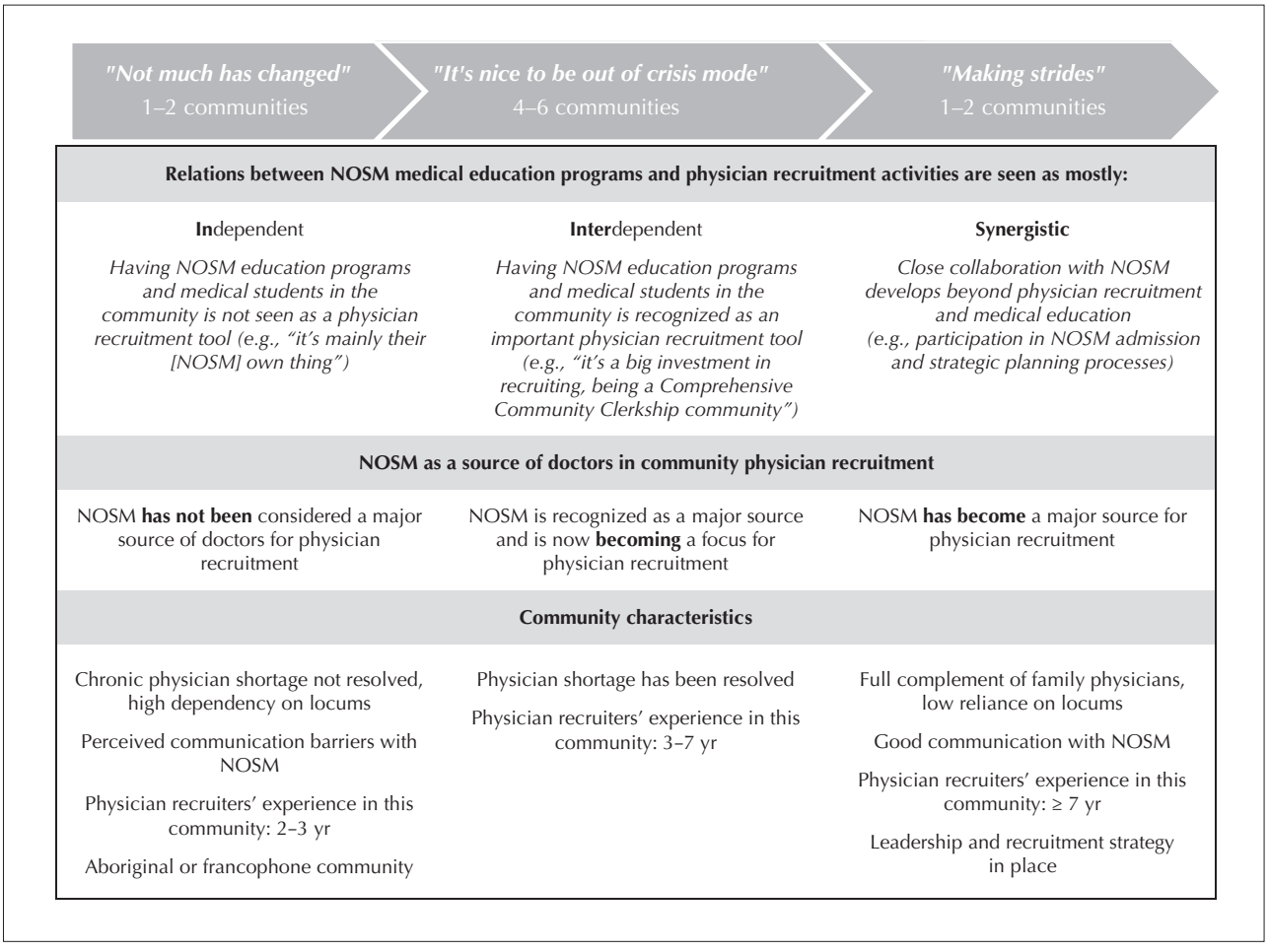


Fig. 2. Summary of key informants' perceptions of the impact of the Northern Ontario School of Medicine (NOSM) on physician recruitment in 8 rural communities that recruited NOSM graduates.

As soon as we get this recruiter hired, the main focus is going to be establishing a relationship with the Northern Ontario School of Medicine. Right now we can't say that we feel like we've benefited [from NOSM's presence in the community]. (KI-2)

Most key informants emphasized that hosting NOSM's educational programs in the communities worked well for physician recruitment in combination with other factors (Fig. 2). The whole community's support, for example, was important to overcome physician shortages but varied among communities. Another factor was the leadership of individual physician recruiters, who, in collaboration with NOSM and other community stakeholders, aligned their internal recruitment strategy with external factors. For instance, key informants talked about physician workforce practice interests or broader health care reforms:

What's changed drastically is our approach. We've changed our strategy to not force doctors or make them feel compelled that they have to work in areas that they're uncomfortable with. (KI-3)

Part of the key was a combination of things, moving from fee-for-service to blended capitation, rostering patients, family health team and the huge presence of NOSM. (KI-5)

Balancing community recruitment and medical education

Interviewees shared a common perception that NOSM sought to protect learners from undue recruitment efforts by communities. This perception was to some extent in conflict with communities' interests in seeing learners as potential recruits. Communities resolved this conflict by prioritizing medical education in the community and leaving physician recruitment to "naturally" stem from the students' experiences. Two key informants described this approach:

When we take on students and residents, we don't do it for the sole purpose of, you know, we're going to try to recruit them. I think first and foremost you have to do this because you're a teaching site and you've got to feel good and honour that you're part of that process. … So we try to make the students feel very comfortable, we don't make them feel like as if we're trying to recruit them. ... If you do all that, well, they'll take a natural liking to your community, and I think that's important. (KI-5)

We try and provide the best learning and living experiences we can for the learners. And then they, quite often, will come back for follow-up electives and rotations. And then the conversation just grows from there … it sort of happens organically from there. There are no greasy sales. I mean, they see it for … what it really is here. (KI-1)

Key informants suggested that better communication between NOSM and the community contributed to better recruitment success. Regardless of perceived adequacy of communication, most key informants noted communication with NOSM as an area for improvement. Informants mentioned the need for better liaison with the school, community visits by school representatives and communities' ability to contact medical learners.

DISCUSSION

In this study, we sought to understand how NOSM, a socially accountable school with the distributed community-engaged learning model, influences physician recruitment into underserviced rural communities of northern Ontario. As of fall 2014, 5 of the 8 communities studied had achieved a full, or almost full, complement of family physicians, which was attributed in large part to NOSM's presence in the region. Communities' increased engagement in NOSM's medical education programs was 1 of the key factors in successful recruitment, allowing for reductions in recruitment budgets, including decreased financial incentives offered to doctors. Other positive outcomes were decreased reliance on locum doctors and increased possibilities for physician workforce planning in regard to skill sets and succession.

Benefits of community-engaged medical education, particularly of longitudinal integrated clerkships, to learners and medical education outcomes are well reported in the literature.[22,24,25] Less is known about benefits of community–medical school relations for the participating communities.[26,27] Our study contributes to this knowledge. Based on the accounts of key informants with first-hand responsibility for physician recruitment to the small rural communities, NOSM is a major (and sometimes the only) source of physicians for these communities. This has implications for communities' traditional recruitment strategies,[28] which were changing from participation at conferences and job fairs to a more "natural" approach of "recruitment without recruiting" through the communities' proactive participation in medical education. Most key informants in our study mentioned the costliness and ineffectiveness of the traditional travel to job fairs for recruiting permanent physicians.

Consistent with other studies,[24,26] our study showed that communities' participation in medical programs requires significant effort and resources. All communities studied were participating in NOSM medical programs, but physician recruit-

ment outcomes and the communities' capacity to be engaged in medical education varied. Not all key informants had full community support, sufficient funds or strong leadership to fully capitalize on the presence of the medical school, as informants in the more successful communities did. This variability may be related to the diversity of problems facing small rural communities, different priorities for allocating human and financial resources, variability in "the nature of social contract" within communities and health care organizations[29] and the complexity of medical school–community relations.[24] Differences in the duration of relations between NOSM and the community, which may have been reflected in the duration and nature of the key informants' work experience, may also be a contributing factor.

The need for physicians with skills to work in Indigenous communities was voiced by key informants in our study. Indigenous peoples experience poor access to medical care[30] and have poorer health status relative to their non-Indigenous neighbours.[31] Francophone people in Ontario also have poorer health status than the general population in the province,[32] and there is a shortage of French-speaking doctors in rural communities in northern Ontario.[33] This may help explain the continuum of NOSM's impact on physician recruitment outcomes in this study: the 2 "least successful" communities were the Indigenous and francophone communities. Cultural variations may represent challenges for community engagement in medical education.[29] A recent study showed that NOSM learners had superior baseline knowledge on the historical, political and geographical issues affecting rural areas, including Indigenous communities.[34] Indigenous health curriculum,[35] mandatory community clerkship in Indigenous communities[8] and support of Indigenous and francophone applicants[36] at NOSM may contribute over the long term toward meeting the need for more physicians for Indigenous and francophone communities. In addition to potential language and cultural barriers, the 2 communities were also among the farthest from NOSM's main campuses. The combination of remoteness and cultural barriers may pose additional communication challenges and intensify problems that all underserviced rural communities face (e.g., spousal employment).[37,38] Additional research is needed to explore possible reasons for lower recruitment success in these communities.

Key informants realized the need for long-term planning of physician recruitment. They also emphasized the importance of having medical learners in their communities, including "local kids" who grew up in the area. This thinking is consistent with a "rural pipeline" approach to recruitment of physicians that involves encouraging rural youth to enter the medical profession and providing rural exposure during medical education.[39,40] NOSM supports all stages of this approach by providing rural exposure during medical training,[12] preadmission contact between rural secondary schools and the medical profession[41] and admission processes to select students with rural, northern, Indigenous and francophone backgrounds.[23] According to most interviewees, physician retention is important but was not yet a priority in their plans, as recruitment had only recently been resolved in their communities. The recent success in physician recruitment suggests the potential for a positive impact of NOSM on physician retention. However, future research is needed to assess the actual effect.

NOSM's impact extends beyond supplying rural doctors and helping small rural communities to overcome physician shortages. Key informants in the communities with a full complement of physicians expressed a strong sense of pride and empowerment from engagement in medical programs. This finding is in line with previous research.[26] At the same time, awareness of the power differential between small rural communities and medical institutions is important for the full positive impact of the socially accountable medical school on the health of the communities. Consistent with previous research,[17] communication with the medical school was challenging for some communities in our study. Our findings provide material for a positive critique and, accordingly, improvements of the relations between NOSM and the communities that are currently engaged with or are planning to become engaged with the medical school, so as to better achieve NOSM's social accountability mandate.

Strengths and limitations

Using the first-hand accounts of key informants who were responsible for physician recruitment was a strength of our study. It should be kept in mind that their views may differ from those of other community members, medical school administrators or students, and physicians and thus may not capture all factors contributing to the impact of NOSM on recruitment in northern Ontario communities. Studying 8 of the 12 community cases initially selected was a limitation. However, the data collected allowed for better understanding of NOSM's impact on physician recruitment and supported

general analytical inferences, including evidence regarding common changes in recruitment approaches and a diversity in outcomes across communities. Most likely, including the other 4 communities would not have had a substantial effect on our results, although it might have enhanced the results with different perspectives (e.g., from physicians in the role of physician recruiters). The study results may be transferrable to other communities participating in medical education with NOSM or other medical schools with a similar social accountability mandate and distributed medical education model.

CONCLUSION

Locating medical educational sites in underserviced rural communities in northern Ontario and engaging these communities in training rural physicians shows great potential to improve the ability of small rural communities to recruit family physicians and alleviate physician shortages in the region. Future studies could extend our findings about the effect of a socially accountable medical education and community-engaged learning model on physician recruitment into underserviced rural communities across Canada and around the world. Other underserviced rural communities that are NOSM educational sites and have not been successful in recruiting NOSM graduates, or communities that are not NOSM educational sites should be studied to better understand the full impact of NOSM on physician recruitment in the region. Additional Indigenous, francophone and remote communities should be studied to understand possible factors affecting lower recruitment. In addition, ongoing studies are needed to assess the impact of NOSM on skill set mix, retention and sustainability of the physician workforce in northern Ontario.

REFERENCES

1. Chan BT, Schultz SE. *Supply and utilization of general practitioner and family physician services in Ontario*. ICES Investigative Report. Toronto: Institute for Clinical and Evaluative Sciences; 2005.
2. Pong RW, Pitblado JR. *Geographic distribution of physicians in Canada: beyond how many and where*. Ottawa: Canadian Institute for Health Information; 2005.
3. Wenghofer EF, Timony PE, Pong RW. A closer look at Ontario's northern and southern rural physician demographics. *Rural Remote Health* 2011;11:1591.
4. *Population and dwelling counts, for Canada, provinces and territories, and economic regions, 2011 and 2006 censuses*. Ottawa: Statistics Canada; 2011. Available: www12.statcan.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Table-Tableau.cfm?LANG=Eng&T=1402&PR=35&SR=1&S=9&O=D (accessed 2017 Apr. 12).
5. Pong RW. Strategies to overcome physician shortages in northern Ontario: a study of policy implementation over 35 years. *Hum Resour Health* 2008;6:24.
6. Northern Ontario School of Medicine. Strategic plan 2015–2020. Available: www.nosm.ca/strategicplan2015-2020/ (accessed 2017 Apr. 12).
7. Canadian Resident Matching Service. *2016 R-1 match — first iteration. Table 8: number of quota by school of residency*. Available: www.carms.ca/wp-content/uploads/2016/05/Table_8_Number_of_Quota_by_School_of_Residency_English.pdf (accessed 2017 Apr. 12).
8. Strasser RP, Lanphear JH, McCready WG, et al. Canada's new medical school: the Northern Ontario School of Medicine: social accountability through distributed community engaged learning. *Acad Med* 2009;84:1459-64.
9. Hogenbirk JC, Timony PE, French MG, et al. Milestones on the social accountability journey: family medicine practice location of Northern Ontario School of Medicine graduates. *Can Fam Physician* 2016;62:e138-45.
10. Grobler L, Marais BJ, Mabunda S. Interventions for increasing the proportion of health professionals practising in rural and other underserved areas. *Cochrane Database Syst Rev* 2015;(6):CD005314.
11. Magnus JH, Tollan A. Rural doctor recruitment: Does medical education in rural districts recruit doctors to rural areas? *Med Educ* 1993;27:250-3.
12. Strasser R, Couper I, Wynn-Jones J, et al. Education for rural practice in rural practice. *Educ Prim Care* 2016;27:10-4.
13. Toomey P, Lovato CY, Hanlon N, et al. Impact of a regional distributed medical education program on an underserved community: perceptions of community leaders. *Acad Med* 2013;88:811-8.
14. Wilson NW, Couper ID, De VE, et al. A critical review of interventions to redress the inequitable distribution of healthcare professionals to rural and remote areas. *Rural Remote Health* 2009;9:1060.
15. Halaas GW, Zink T, Finstad D, et al. Recruitment and retention of rural physicians: outcomes from the rural physician associate program of Minnesota. *J Rural Health* 2008;24:345-52.
16. Worley P, Martin A, Prideaux D, et al. Vocational career paths of graduate entry medical students at Flinders University: a comparison of rural, remote and tertiary tracks. *Med J Aust* 2008;188:177-8.
17. Hogenbirk JC, Robinson DR, Hill ME, et al. The economic contribution of the Northern Ontario School of Medicine to communities participating in distributed medical education. *Can J Rural Med* 2015;20:25-32.
18. Creswell JW. *Qualitative inquiry and research design. Choosing among five approaches*. 2nd ed. Thousand Oaks (CA): SAGE Publications; 2007.
19. Kralj B. *Measuring rurality — RIO2008 BASIC: methodology and results*. Toronto: Ontario Medical Association; 2009.
20. Pope C, Ziebland S, Mays N. Qualitative research in health care. Analysing qualitative data. *BMJ* 2000;320:114-6.
21. Yin RK. *Case study research: design and method*. Thousand Oaks (CA): SAGE Publications; 2003.
22. Couper I, Worley PS, Strasser R. Rural longitudinal integrated clerkships: lessons from two programs on different continents. *Rural Remote Health* 2011;11:1665.
23. Strasser R, Hogenbirk JC, Minore B, et al. Transforming health professional education through social accountability: Canada's Northern Ontario School of Medicine. *Med Teach* 2013;35:490-6.
24. Ellaway RH, O'Gorman L, Strasser R, et al. A critical hybrid realist-outcomes systematic review of relationships between medical education programmes and communities: BEME Guide No. 35. *Med Teach* 2016;38:229-45.
25. Thistlethwaite JE, Bartle E, Chong AA, et al. A review of longitudinal community and hospital placements in medical education: BEME Guide No. 26. *Med Teach* 2013;35:e1340-64.
26. Lovato C, Bates J, Hanlon N, et al. Evaluating distributed medical education: What are the community's expectations? *Med Educ* 2009;43:457-61.
27. Myhre DL, Bajaj S, Woloschuk W. Practice locations of longitudinal integrated clerkship graduates: a matched-cohort study. *Can J Rural Med* 2016;21:13-6.
28. Jutzi L, Vogt K, Drever E, et al. Recruiting medical students to rural practice: perspectives of medical students and rural recruiters. *Can Fam Physician* 2009;55:72-3.

29. Strasser R, Worley P, Cristobal F, et al. Putting communities in the driver's seat: the realities of community-engaged medical education. *Acad Med* 2015;90:1466-70.
30. Shah BR, Gunraj N, Hux JE. Markers of access to and quality of primary care for aboriginal people in Ontario, Canada. *Am J Public Health* 2003;93:798-802.
31. MacMillan HL, Walsh CA, Jamieson E, et al. The health of Ontario First Nations people: results from the Ontario First Nations Regional Health Survey. *Can J Public Health* 2003;94:168-72.
32. Bouchard LI, Gaboury MH, Chomienne I, et al. *Profile santé des communautés francophones minoritaires au Canada*. Ottawa: Réseau de recherche interdisciplinaire sur la santé des francophones en contexte minoritaire au Canada, Université d'Ottawa; 2009.
33. Timony PE, Gauthier AP, Hogenbirk JC, et al. Promising quantities, disappointing distribution. Investigating the presence of French-speaking physicians in Ontario's rural francophone communities. *Rural Remote Health* 2013;13:2543.
34. Coke S, Kuper A, Richardson L, et al. Northern perspectives on medical elective tourism: a qualitative study. *CMAJ Open* 2016;4: E277-83.
35. Jacklin K, Strasser R, Peltier I. From the community to the classroom: the Aboriginal health curriculum at the Northern Ontario School of Medicine. *Can J Rural Med* 2014;19:143-50.
36. Northern Ontario School of Medicine. *An indigenous focus*. Available: www.nosm.ca/indigenous/ (accessed 2017 Apr. 12).
37. Mayo E, Mathews M. Spousal perspectives on factors influencing recruitment and retention of rural family physicians. *Can J Rural Med* 2006;11:271-6.
38. Wasko K, Jenkins J, Meili R. Medical practice in rural Saskatchewan: factors in physician recruitment and retention. *Can J Rural Med* 2014;19:93-8.
39. Henry JA, Edwards BJ, Crotty B. Why do medical graduates choose rural careers? *Rural Remote Health* 2009;9:1083.
40. Tesson G, Strasser R, Pong RW, et al. Advances in rural medical education in three countries: Canada, the United States and Australia. *Rural Remote Health* 2005;5:397.
41. Northern Ontario School of Medicine. *Youth initiatives*. Available: www.nosm.ca/communities/youth/default.aspx?id=3904 (accessed 2017 Apr. 12).

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