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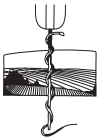
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"A canoe has all the elements that invite an artist to record on canvas. Its curves beckon to be painted while one marvels at the expanse of its history."

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### Wildfire

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**F**ires don't really threaten modern cities, but any disaster can easily overwhelm or even destroy a small town. The drama is intense — enough to draw in media all the way from the city to cover it. Even just the threat of a fire will quickly permeate through town. Everyone will go outside and watch the pall of smoke, fire and ash on the horizon, and everyone does what needs to be done, including the doctors.

Recently the portion of the Trans-Canada Highway that goes past our town has been closed because of wildfire at the edge of the road. We were thankful to have it easy, as it was neighbours to the north whose town was at risk of evacuation. At our rural hospital, the chief of staff, the latest in the rotation who has taken on that burden (as the noblesse oblige that it is), sent the requisite memo as the smell of smoke was hanging in the air. As M\*A\*S\*H's Radar O'Reilly would say, we needed to prepare for "incoming."

It's been a while since our last disaster, mock or otherwise, but somewhere in the depth of some policy manual we have the policies and procedures. The cascading telephone list to call up all staff and physicians. Who should inform the media (a good job for adminis-

tration to handle). How to set up the triage tent. The details of liaising with the police for crowd control. Who (oh yeah, it's me as chair of admission and discharge) goes to the floor and discharges patients to make room.

It can be done and is done, regardless of whether it's Walkerton and *E. coli*, Dryden and their plane crash, or the Hinton train collision. A procedure manual and a mock disaster exercise help. But even without them, we make do, at times over our heads and with limited resources, as there is no viable alternative. The question is not if we do something that needs to be done, but how best to do it. In a way, a major disaster is just an extension of what we do every day.

The willingness to make do (and the support from all others in town) is one of those things that makes rural practice special. I'm far too grizzled to look forward to such circumstances anymore, but I'm glad for the knowledge that I can depend on my colleagues to solve such problems collectively.

To all those unsung doctors who have been pulled up from sleep or regular work to heed the call that comes in such circumstances: thanks. You have made a difference when it counts in those rural disasters, small and large.



### Feux sauvages

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**L**es incendies ne menacent pas vraiment les métropoles modernes, mais toute catastrophe peut facilement endommager gravement une petite ville ou même la détruire. Le drame est intense — assez pour attirer les médias de la grande ville qui veulent couvrir l'événement. Il suffit d'une menace d'incendie pour mettre rapidement sur pied d'alerte tous les habitants. Tous sortent regarder la colonne de fumée, de feu et de cendres à l'horizon et tous, y compris les médecins, prennent les mesures nécessaires.

Le tronçon de la Transcanadienne qui passe près de notre ville a été fermé récemment à cause d'un feu de brousse en bordure de la route. Nous avons été reconnaissants d'y échapper belle, car ce sont nos voisins de la ville située au nord de la route qui risquaient d'avoir à évacuer. À notre hôpital rural, le chef de médecine, le dernier de ceux qui se sont succédés à cette charge, a diffusé la note de service obligatoire (noblesse oblige) pendant que l'odeur de fumée se propageait dans l'air. Comme Radar O'Reilly de M\*A\*S\*H le dirait si bien, nous devons nous préparer à faire face aux « arrivées ».

Notre dernière catastrophe, simulée ou autre, remonte à un certain temps, mais nous avons quelque part dans les entrailles d'un manuel un énoncé des politiques et procédures de circonstance. On y trouve la liste des numéros de téléphone à composer en cascade pour convoquer tout le personnel et les médecins. Qui devrait informer les médias (une bonne tâche à confier à l'administration). Comment monter la

tente de triage. Les détails sur la liaison avec les services de police pour le contrôle des foules. Qui (en passant, c'est moi à titre de directeur de l'admission et des congés) se rend dans les salles donner leur congé aux patients pour faire de la place.

La tâche est faisable et elle se fait, qu'il s'agisse de Walkerton et de *E. coli*, de Dryden et de l'écrasement d'un avion, ou de la collision de trains à Hinton. Un manuel de procédures et un exercice de simulation de catastrophe sont utiles. Mais même sans eux, nous nous débrouillons, parfois avec les moyens du bord et avec des ressources limitées, car il n'existe pas d'autre solution viable. La question ne consiste pas à savoir si nous faisons ce qui s'impose : il s'agit plutôt de savoir quelle est la meilleure façon de s'y prendre. En réalité, une catastrophe majeure constitue seulement un prolongement de nos activités de tous les jours.

La volonté de nous débrouiller (et l'appui de tous nos concitoyens) est une des choses qui rendent spéciale la pratique en milieu rural. J'en ai maintenant fait l'expérience trop souvent pour attendre impatiemment de telles circonstances, mais je me réjouis de savoir que je peux compter sur mes collègues pour régler collectivement les problèmes.

À tous ces médecins œuvrant dans l'ombre qui ont été tirés de leur sommeil ou de leur travail habituel par un appel d'urgence, je dis merci. Vous avez fait une différence lorsque toutes les interventions comptaient pour faire face à une catastrophe, petite ou grande, dans votre communauté rurale.



### President's message. *Nani gigantum humeris insidentes*\*

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**T**his metaphor<sup>1</sup> can be translated, with some poetic licence, as, "Developing future plans by understanding the works of notable thinkers of the past." As incoming president, I thought it appropriate to look back at the history of the SRPC to try to learn from it and be inspired by it.

The first thing that stands out is we started out small, but not timid — the first issue of the forerunner of *CJRM* was titled "Mad as hell!"<sup>2</sup> What was the reason for this acrimony? As Dr. David Fletcher, former SRPC president, put it, "It is not that there is a plan to destroy rural health care, but that there is no plan to save it."<sup>2</sup> The SRPC came into being to

educate and empower the rural community to deal with declining medical services. ... As individuals, we can barely sustain our current levels of practice. Together we can be a solid voice that cannot be ignored.<sup>2</sup>

Since the SRPC was founded in 1992, we have managed to link, inform and empower rural physicians by means of the RuralMed online community, the SRPC website, *CJRM* and the *Manual of Rural Practice*.

Probably one of our biggest achievements is that relationships were forged with national and international bodies, governments, universities and other health professionals, which enabled us to increase visibility of rural issues (e.g., rural recruitment and retention strategies), to influence educational programs (e.g., the admission of rural-origin students to medical schools) and to lobby for government support for rural health care (e.g., the 2001 submission to the Romanow Commission).<sup>3</sup>

Since 1992, SRPC membership has

grown from 40 to 4400 (including students and residents). In Whistler, BC, 650 SRPC members participated in the annual Rural and Remote Medicine Course (the largest rural medicine conference in the world). Today rural medicine is considered a valid career option and every family practice residency in the country has a rural coordinator.

What lies ahead for the SRPC?

As Niels Bohr said, "Prediction is very difficult, especially about the future." What we do know, however, is that we cannot become complacent, especially with the possibility that the mandatory 8 weeks of rural rotation will be abolished from family medicine programs. We have to be prepared to be "mad as hell" again to fight this. We must continue to agitate for equitable intake of rural students into medical schools and equitable distribution of medical human resources into rural areas, as these are 2 of the issues that have not improved substantially in recent years.

Our job is not done.

**Acknowledgements:** With thanks to past presidents for their input: Keith MacLellan, Peter Hutten-Czapski, Trina Larsen Soles, Michael Jong, Karl Stobbe and John Wootton.

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\*Dwarfs standing on the shoulders of giants.

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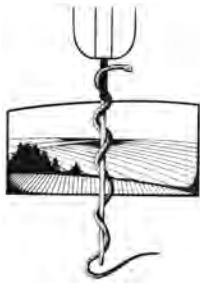
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## Message du président. *Nani gigantum humeris insidentes*\*

Avec un peu de liberté poétique, il est possible de traduire ainsi cette métaphore<sup>1</sup> : « Élaborer des plans d'avenir en comprenant le travail des grands penseurs du passé ». À titre de nouveau président, j'ai jugé approprié de jeter un coup d'œil rétrospectif sur l'histoire de la SMRC afin d'essayer d'en tirer des leçons et de m'en inspirer.

La première chose qui ressort, c'est que nous avons commencé modestement, mais sans timidité — le premier numéro du prédécesseur du *JCMR* s'intitulait « Mad as hell ! »<sup>2</sup>. Pourquoi tant d'acrimonie ? Comme le disait le Dr David Fletcher, ancien président de la SMRC : « Ce n'est pas tant qu'il y a un plan visant à détruire les soins de santé ruraux : c'est plutôt qu'il n'y en a aucun pour les sauver<sup>2</sup>. » La SMRC

a vu le jour pour informer et responsabiliser la communauté rurale afin de l'aider à faire face à la baisse des services médicaux. ... Individuellement, nous pouvons à peine maintenir les niveaux de service que nous offrons actuellement. Collectivement, nous pouvons constituer une voix solide et incontournable<sup>2</sup>.

Depuis la création de la SMRC en 1992, nous avons réussi à relier, informer et responsabiliser les médecins ruraux au moyen de la communauté virtuelle RuralMed, du site de la SMRC, du *JCMR* et du *Manual of Rural Practice*.

Une de nos plus grandes réalisations réside probablement dans les liens que nous avons noués avec des entités canadiennes et étrangères, des gouvernements, des universités et d'autres professionnels de la santé, ce qui nous a permis de donner plus de visibilité aux enjeux ruraux (p. ex., stratégies de recrutement et de fidélisation en milieu rural), d'agir sur les programmes d'éducation (p. ex., admission d'étudiants ruraux dans les facultés de médecine) et d'exercer sur le gouvernement des pressions pour qu'il appuie les soins de santé en milieu rural (p. ex., le mémoire présenté en 2001 à la Commission Romanow)<sup>3</sup>.

Depuis 1992, l'effectif de la SMRC est passé de 40 à 4400 membres (y compris étudiants et médecins résidents). À Whistler (C.-B.), 650 membres de la SMRC ont participé au cours annuel sur la médecine en milieu rural et éloigné (la plus importante conférence sur la médecine rurale au monde). La médecine rurale est maintenant considérée comme un choix de carrière valable et toutes les résidences en médecine familiale au Canada comptent sur les services d'un coordonnateur de la médecine rurale.

Quel avenir attend la SMRC ?

Comme le disait Niels Bohr, « Il est très difficile de prédire, en particulier l'avenir ». Ce que nous savons toutefois, c'est que nous ne pouvons céder à la complaisance, surtout face à l'abolition possible, par les programmes de formation en médecine familiale, du stage obligatoire de 8 semaines en milieu rural. Nous devons nous préparer de nouveau à lutter « furieusement » contre cette possibilité. Nous devons continuer de militer en faveur de l'admission équitable d'étudiants ruraux dans les facultés de médecine et de la répartition équitable des ressources humaines de la médecine dans les régions rurales, car il s'agit là de 2 des enjeux qui ne se sont pas améliorés pour la peine ces dernières années.

Notre travail n'est pas fini.

**Remerciements :** Nous remercions les anciens présidents de leurs commentaires : Keith MacLellan, Peter Hutten-Czapski, Trina Larsen Soles, Michael Jong, Karl Stobbe et John Wootton.

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\*Des nains sur des épaules de géants.



## Barriers to patient care in southwestern Ontario rural emergency departments: physician perceptions

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reviewed.

**Introduction:** We sought to determine the perceptions of physicians staffing rural emergency departments (EDs) in southwestern Ontario with respect to factors affecting patient care in the domains of physical resources, available support and education.

**Methods:** A confidential 30-item survey was distributed through ED chiefs to physicians working in rural EDs in southwestern Ontario. Using a 5-point Likert scale, physicians were asked to rate their perception of factors that affect patient care in their ED. Demographic and practice characteristics were collected to accurately represent the participating centres and physicians.

**Results:** Twenty-seven of the 164 surveys distributed were completed (16% response rate). Responses were received from 13 (81.3%) of the 16 surveyed EDs. Most of the respondents (78%) held CCFP (Certificant of the College of Family Physicians) credentials, with no additional emergency medicine training. Crowding from inpatient boarding, and inadequate physician staffing or coverage in EDs were identified as having a negative impact on patient care. Information sharing within the hospital, access to emergent laboratory studies and physician access to medications in the ED were identified as having the greatest positive impact on patient care. Respondents viewed all questions in the domain of education as either positive or neutral.

**Conclusion:** Our survey results reveal that physicians practising emergency medicine in southwestern Ontario perceive crowding as the greatest barrier to providing patient care. Conversely, the survey identified that rural ED physicians perceive information sharing within the hospital, the availability of emergent laboratory studies and access to medications within the ED as having a strongly positive impact on patient care. Interestingly, our findings suggest that physicians in rural EDs view their access to education as adequate, as responses were either positive or neutral in regard to access to training and ability to maintain relevant skills.

**Introduction :** Nous voulions déterminer ce que les médecins affectés aux urgences des hôpitaux ruraux du sud-ouest de l'Ontario pensent des facteurs liés aux ressources physiques, au soutien disponible et à l'éducation qui ont une incidence sur le soin des patients.

**Méthodes :** Un questionnaire confidentiel de 30 questions a été distribué par l'entremise des directeurs de l'urgence aux médecins œuvrant au service d'urgence d'hôpitaux ruraux du sud-ouest de l'Ontario. À partir d'une échelle de Likert à 5 points, on a demandé aux médecins d'évaluer leur perception des facteurs qui ont une incidence sur le soin des patients à leur service d'urgence. On a réuni les caractéristiques démographiques et professionnelles de façon à représenter fidèlement les centres et les médecins participants.

**Résultats :** Vingt-sept des 164 questionnaires distribués ont été remplis (taux de réponse de 16 %). On a reçu des réponses de 13 (81,3 %) des 16 services d'urgence sondés. La plupart des répondants (78 %) détenaient un CCMF (certificat du Collège de médecins de famille) et n'avaient pas de formation supplémentaire en médecine d'urgence. Les répondants ont indiqué que l'encombrement causé par les patients admis mais en attente de chambre et le manque de médecins ou de couverture à

l'urgence avaient un effet négatif sur le soin des patients. Ils ont indiqué que le partage d'information à l'intérieur de l'hôpital, l'accès à des examens de laboratoire d'extrême urgence et l'accès, pour les médecins, aux médicaments à l'urgence avaient l'effet positif le plus important sur le soin des patients. Les répondants considéraient comme positives ou neutres toutes les questions liées au domaine de l'éducation.

**Conclusion :** Nos résultats de sondage révèlent que les médecins qui pratiquent la médecine d'urgence dans le sud-ouest de l'Ontario considèrent l'engorgement comme le principal obstacle à la prestation des soins aux patients. Par contre, le sondage a permis de déterminer que les médecins des urgences rurales sont d'avis que le partage d'information à l'intérieur de l'hôpital, la disponibilité d'analyses de laboratoire d'extrême urgence et l'accès aux médicaments à l'urgence ont un effet fortement positif sur le soin des patients. Nos constatations indiquent que les médecins des urgences rurales jugent adéquat leur accès à l'éducation, car les réponses étaient positives ou neutres en ce qui a trait à l'accès à l'information et à la capacité de maintenir les compétences spécialisées pertinentes, ce qui est intéressant.

## INTRODUCTION

The unique concerns of physicians staffing the front lines of rural emergency departments (EDs) need to be explored. It has been shown that rural EDs in Ontario do better in regard to wait times and meeting Canadian Emergency Department Triage and Acuity Scale (CTAS) benchmarks when compared with urban counterparts.<sup>1</sup> However, a report on rural health has shown that rural and urban residents have differing levels of chronic diseases, self-reported health and mental illness, with rural areas reportedly having an overall "health disadvantage."<sup>3</sup> One study has also demonstrated that more than 70% of physicians staffing rural EDs in southwestern Ontario had no formal training in emergency medicine.<sup>4</sup> It is clear that physicians staffing rural EDs practise a distinct form of medicine and, thus, may have similar challenges to delivering care in rural environments.<sup>5</sup>

To address these challenges, the Canadian Association of Emergency Physicians (CAEP) contributed to the Romanow Commission by forming a committee to describe the state of emergency care and to guide the delivery of rural emergency medicine in Canada.<sup>6</sup> The committee advised that equipment and facilities should be enhanced and adapted to accommodate the unique challenges of the rural health care environment, that rural emergency physicians should be supported by improved initial training and innovative continuing medical education, and that regionalized models of rural emergency care should be studied.<sup>6</sup>

The purpose of our study was to further this dialogue and to examine what physicians staffing rural EDs in southwestern Ontario perceive as positive

or negative factors that have an impact on patient care within the domains identified by CAEP: physical resources, available support and education.

## METHODS

The development of the questions and domains for the survey tool was based on the 2002 CAEP recommendations to the Romanow Commission and a survey of safety concerns within rural EDs in the United States.<sup>6,7</sup> The survey tool also consisted of 5 demographic questions, previously used by Bhimani and colleagues,<sup>4</sup> to characterize the backgrounds of respondents and their practice environments. The physicians were asked to assess the perceived impact of 25 factors affecting patient care in the domains of physical resources, support and training using a 5-point Likert scale. The Likert scale ranked impact on patient care from strongly negative (a score of 1) to strongly positive (a score of 5).

The procedure for determining what ED sites would be included in the study was based on the Rurality Index for Ontario (RIO), which is currently used for the identification and funding of rural communities in Ontario.<sup>8</sup> A RIO score greater than 40 identified rural EDs in southwestern Ontario.

Physician chiefs and leaders of identified rural EDs were contacted by telephone and email between June and July 2010 and were asked to participate in the research as study coordinators, requiring them to distribute surveys to their staff. Surveys were mailed to the physician leaders who agreed to participate with instructions to distribute all research materials to physicians currently working in the ED. Participant consent was implied with the completion

of the survey, as explained in the survey instructions. The collected surveys from each site were to be mailed anonymously in an envelope provided in the package of survey materials to the research team 1 month after distribution. A single follow-up, by email or telephone, was made with physician leaders 1 week after the return deadline. Further reminders were not attempted, and data collection was closed 2 months after distribution.

Demographic and practice characteristics of each respondent were recorded. The results of the 5-point Likert scale questions were graphed using Microsoft Excel. Mean scores, standard deviations, confidence intervals (CIs) and rank orders were calculated for each question within the study domains. We calculated rank orders for each domain and organized data into tabular form.

Approval was obtained from the Health Sciences Research Ethics Board of The University of Western Ontario to survey physicians working in rural EDs across southwestern Ontario.

## RESULTS

Physician leaders from 16 (88.9%) of the 18 identi-

**Table 1. Training, experience and hospital characteristics of 27 emergency department physicians**

Characteristic	No. (%) of respondents
Training	
CCFP	21 (77.8)
CCFP(EM)	3 (11.1)
Other	3 (11.1)
Additional qualifications	
ACLS	27 (100.0)
ATLS	21 (77.8)
PALS	5 (14.8)
Years in practice	
< 5	9 (33.3)
5–10	2 (7.4)
11–15	4 (14.8)
16–20	2 (7.4)
> 20	10 (37.0)
ED volume, patients per year	
< 10 000	3 (12.0)
10 000–20 000	20 (80.0)
> 20 000	2 (8.0)
No. of beds in hospital	
< 20	8 (29.6)
21–50	17 (63.0)
51–100	2 (7.4)

ACLS = Advanced Cardiac Life Support; ATLS = Advanced Trauma Life Support; CCFP = Certificatant of the College of Family Physicians; CCFP(EM) = Certificatant of the College of Family Physicians (Emergency Medicine); ED = emergency department; PALS = Pediatric Advanced Life Support.

fied EDs agreed to participate in the study. Thirteen centres (81.3%) returned surveys to the research team between August and October 2010, with a total of 27 of the 164 requested surveys completed (16% response rate). The average number of returned surveys per site was 2.1 (standard deviation 1.1).

The respondent demographic and practice characteristics are presented in Table 1. Study questions were organized into 3 domains based on the content of the question: physical resources (Table 2), available support (Table 3) and training (Table 4). Means and 95% CIs were calculated based on the responses on a 5-point Likert scale.

Through an open-ended question, respondents identified other sources of staffing or coverage within the EDs that had a positive impact on patient

**Table 2. Perceived impact of physical resources on patient care in emergency departments**

Resource	Mean score* (95% CI)
Information sharing within the hospital	4.35 (4.02–4.68)
Access to emergent laboratory studies	4.29 (4.00–4.58)
Physician access to medications in ED	4.23 (3.94–4.52)
Access to emergent radiography	4.00 (3.62–4.38)
Information sharing with external centres	3.92 (3.55–4.29)
Access to emergent CT	3.76 (3.28–4.24)
Patient access to medication after ED discharge	3.69 (3.39–3.99)
Access to emergent MRI	3.20 (2.76–3.64)
Crowding from inpatient boarding in ED	2.31 (1.88–2.74)

CI = confidence interval; CT = computed tomography; ED = emergency department; MRI = magnetic resonance imaging.

\*On a 5-point Likert scale.

**Table 3. Perceived impact of support on patient care in emergency departments**

Support	Mean score* (95% CI)
Ambulance diversions directly to tertiary centres	4.11 (3.76–4.46)
Ambulance diversions directly to tertiary centre transfers	3.88 (3.40–4.36)
Availability of specialty consult within hospital	3.73 (3.20–4.26)
Availability of specialty consult with tertiary centres	3.65 (3.11–4.19)
Availability of consult with other health care providers (excluding tertiary centres)	3.62 (3.18–4.06)
Follow-up for ED care	3.48 (3.18–3.78)
Adequate staffing/coverage in ED by nurses	3.19 (2.81–3.57)
Availability of language interpreters	3.13 (2.69–3.57)
Adequate staffing/coverage in ED by physicians	2.67 (2.19–3.15)

CI = confidence interval; ED = emergency department.

\*On a 5-point Likert scale.

care. The presence of physician assistants was volunteered by 4 physicians and nurse practitioners by 3 physicians (14.8% and 11.1% of respondents, respectively) as having a positive impact on patient care (mean score 4.25 [95% CI 4.23–4.27] and 4.33 [95% CI 4.31–4.35], respectively).

Overall, physicians perceived crowding from inpatient boarding in EDs, and inadequate physician staffing or coverage in EDs as having a negative impact on patient care. Factors having the most positive impact on patient care included access to information sharing within the hospital, access to emergent laboratory studies, access to medications in the ED and ambulance diversions to tertiary centres.

## DISCUSSION

Patient crowding from inpatient boarding was identified as having the most negative impact on patient care; such congestion has been shown in the United States to increase wait times, diversions of ambulances and the risk of undesirable outcomes.<sup>9</sup> This may be an area that could be addressed to ensure timely care for patients in rural EDs.

Inadequate physician staffing or coverage in EDs was also identified as having a significantly negative impact on patient care. Another recent Canadian study demonstrated that the strongest factors for the dissatisfaction of rural physicians emerge from the “ability to find locum tenens coverage” and “availability of professional backup.”<sup>10</sup> The results of our study suggest that the lack of physicians working in rural EDs may cause an increased burden on current rural ED physicians. To retain and recruit physicians to rural communities, the issue of greater staffing and coverage of rural EDs needs to be addressed.

Interestingly, all other areas were identified as having either a neutral or positive impact on patient care in rural EDs. Access to physical resources was

found to be predominantly positive. This would suggest that, in southwestern Ontario, physicians working in EDs have access to the resources essential for providing adequate treatment to their patient population. These results may indicate that recommendations that physical resources in rural areas be standardized to meet the unique challenges of the rural environment have been implemented.<sup>6</sup>

As well, the positive results of physician access to training in rural EDs were an encouraging finding. Lower ED volume and separation from academic institutions may make it difficult for rural physicians to maintain skills and knowledge. Our results suggest that rural ED physicians feel that access to training and the ability to maintain knowledge in their field is adequate. The training available to physicians in rural EDs appears to be meeting their needs.

Finally, 4 physicians volunteered that physician assistants and 3 that nurse practitioners were resources that had a positive impact on patient care. Another study examining the role of nurse practitioners in a rural ED showed a decrease in wait times for low-acuity patients and potentially fewer patients who left without treatment.<sup>11</sup> This may be an interesting finding, and should be explored in future studies, as our study was not intended to examine the role of allied health professionals staffing rural EDs.

## Limitations

The limitations of this study include the low response rate. Although many sites participated in the study, only an average of 2.1 (SD 1.1) physicians per site responded. The low SD among sites suggests that sites were equally represented, but greater physician participation would be necessary to further validate the results of this study.

Furthermore, although researchers and the Ontario Ministry of Health and Long-Term Care generally accept RIO scores as a measure of rurality, the scores are based on historical data and the cut-off for rurality is based on an arbitrary number. Further studies using different measures of rurality may elicit differences between rural and suburban communities, which were excluded by the current RIO cut-offs.

Lastly, rural EDs in southwestern Ontario may be considered “close rural,” with most communities located in moderate or strong metropolitan-influenced zones.<sup>12</sup> These results cannot necessarily be generalized to all rural areas of Ontario; results may

**Table 4. Perceived impact of training on patient care in emergency departments**

Training	Mean* (95% CI)
Resources to follow evidence-based emergency protocols	3.96 (3.63–4.29)
Ability to maintain emergency training skills	3.61 (3.20–4.02)
Training of ED nurses	3.53 (3.18–3.88)
Training of ED physicians	3.44 (3.18–3.70)
Access to CME	3.40 (2.95–3.85)

CI = confidence interval; CME = continuing medical education; ED = emergency department.

\*On a 5-point Likert scale.



change when isolated rural centres with less access to nearby urban centres are analyzed.

## CONCLUSION

Our results suggest that physicians practising in EDs in rural southwestern Ontario identify inpatient congestion as well as inadequate physician staffing of EDs as having a negative impact on patient care.

Several factors were identified as having a positive impact on patient care, including access to information sharing, availability of emergent laboratory studies (e.g., radiography) and diversions to tertiary centres. These preliminary findings from physicians who staff the front lines needs to be further validated and included in future dialogue to continue to improve the care provided in EDs in rural Canada.

**Competing interests:** None declared.

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## Impact of physician distribution policies on primary care practices in rural Quebec

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**Introduction:** Accessibility and continuity of primary health care in rural Canada are inadequate, mainly because of a relative shortage of family physicians. To alleviate the uneven distribution of physicians in rural and urban regions, Quebec has implemented measures associated with 3 types of physician practices in rural areas. The objectives of our study were to describe the practices of these types of physicians in a rural area and to analyze the impact of physician distribution policies aimed at offsetting the lack of resources.

**Methods:** Data were drawn from a medical administrative database and included information related to physicians' practices in the rural area of Beauce, Que., in 2007.

**Results:** The practices of permanently settled physicians in rural areas differ from those of physicians who substitute for short periods. Permanently settled physicians offer mostly primary care services, whereas physicians who temporarily substitute devote much of their time to hospital-based practice.

**Conclusion:** Physician distribution policies implemented in Quebec to compensate for the lack of medical resources in rural areas have reduced the deficit in hospital care but not in primary care.

**Introduction :** L'accessibilité des soins de santé primaires et leur continuité laissent à désirer dans le Canada rural, principalement à cause d'une relative pénurie de médecins de famille. Pour compenser la distribution inégale des médecins entre les régions rurales et les villes, le Québec a instauré des mesures associées à 3 types de pratiques médicales dans les régions rurales. Notre étude avait pour objectifs de décrire les types de pratique de ces médecins et d'analyser l'impact des politiques de distribution des effectifs médicaux visant à compenser les pénuries.

**Méthodes :** Nous avons extrait les données d'une base administrative médicale et nous y avons inclus l'information relative aux pratiques médicales dans la région rurale de la Beauce, au Québec, en 2007.

**Résultats :** Les pratiques des médecins établis à demeure dans les régions rurales diffèrent de celles des médecins qui remplacent pour de courtes périodes. Les médecins qui s'établissent en région rurale offrent surtout des services de soins primaires, tandis que ceux qui occupent des postes de remplacement temporaires consacrent principalement leur temps à la pratique hospitalière.

**Conclusion :** Les politiques de répartition des effectifs médicaux appliquées au Québec pour compenser les pénuries en région rurale ont réduit les pénuries de médecins pour les soins hospitaliers, mais non pour les soins primaires.

### INTRODUCTION

The effectiveness of primary care services is a major component of overall health system performance.<sup>1,2</sup> Two important dimensions of effectiveness are

accessibility and continuity of care. In many industrialized countries, accessibility and continuity of care are inadequate and are often linked to a relative shortage of family physicians.<sup>3-5</sup> This deficit in primary care services is more

striking in rural areas, where the proportion of individuals in greater need of primary care, such as seniors and those with chronic diseases, is more apparent.<sup>6,7</sup> To offset this imbalance in distribution of family physicians in rural and urban areas, governments have implemented several types of measures. These include encouraging young physicians from rural areas to practise in their home region,<sup>6,8</sup> offering financial incentives to set up practice in rural areas<sup>9</sup> and providing medical training programs in rural areas.<sup>10,11</sup>

In Canada, various measures have been introduced to solve this problem. For instance, Quebec has implemented regional physicians supply plans (plans régionaux d'effectifs médicaux [PREM]), specific medical activities programs (activités médicales particulières [AMP]) and a locum system (système de dépannage). The goal of PREM, implemented regionally, is to set up targets for recruitment of general practitioners for each administrative region that would lead to equitable distribution among regions in the province.<sup>12</sup>

Activités médicales particulières, also implemented regionally, has the objective of reducing the shortage of physicians in health care establishments in targeted regions. For the most part, AMP is concerned with hospital emergency departments and acute and longer-term care facilities and involves on-call duty. General practitioners who have been in practice for less than 15 years must complete 12 hours of AMP per week. Physicians with 15 to 20 years of experience must perform 6 hours of AMP per week. Finally, AMP does not apply to physicians who have been in practice for more than 20 years.<sup>13,14</sup>

The locum system has been implemented throughout the province. The goal of this policy is to ensure ongoing provision of health services in emergency departments and rural hospitals. The locum system consists of temporarily replacing general practitioners in the performance of their regular tasks, or compensating for a physician shortage that hampers the provision of urgent and needed care to patients in an institution.<sup>15</sup> According to the Ministry of Health and Social Services (Ministère de la santé et des services sociaux [MSSS]), using a locum system enables an institution experiencing a shortage of physicians to maintain continuity of primary medical care (in emergency and acute care departments) during the prolonged absence of 1 or several general practitioners.<sup>15</sup>

In relation to these measures, there are 3 types of physicians practising in rural areas: physicians

who live permanently in the territory (locally settled physicians), physicians who come from other areas in the region and are subject to AMP (regional physicians), and locum physicians who come from outside the region.

To our knowledge, no study has compared the practices of locum and regional physicians with those of physicians settled locally. We sought to describe the practices of physicians working in one rural territory and to analyze whether the physician distribution policies alleviated deficiencies in the provision of primary care. We hypothesized that the practices of locum and regional physicians differ from those of locally settled physicians.

## METHODS

### Context

Our study is descriptive and retrospective. It includes all family physicians working in Beauce, Que., during 2007. Beauce is a rural territory located in the Chaudière–Appalaches region, which consists of a total of 5 territories. Beauce covers an area of 2843 km<sup>2</sup> and in 2007 had a population of 69 046. There are 200-bed long-term care institutions established in 3 sites, a general and specialized care hospital with 142 short-stay beds, and 2 local community health centres (centre local de services communautaires [CLSCs]) broken up into 5 sites. Beauce also has 23 medical clinics and 2 family medicine groups (FMGs).<sup>16</sup> Family medicine groups are groups of 6–10 freely associated general practitioners who work in close collaboration with nurses and offer services to rostered patients.<sup>17</sup> Beauce is located in a region undersupplied by physicians (0.95 general practitioners per 1000 inhabitants), when compared with other regions in the province (average of 1.03 general practitioners per 1000 inhabitants).<sup>18</sup> Beauce is 100 km from a major metropolitan area (the city of Québec). Its proximity to Québec favours the recruitment of locum physicians.

### Data source

Our data were drawn from the Régie de l'assurance maladie du Québec (RAMQ) database, which contains information on physician billing, distribution of income generated from different sites of practice, individual characteristics and some information about patients. This information was available for all physicians who practise, even minimally, in the

Beauce territory. We did not have information about medical practice outside this territory.

The study population includes family physicians who billed for at least 1 service in the territory of Beauce between Jan. 1 and Dec. 31, 2007. We identified the types of physicians through the main practice setting that they reported.

We used physicians' earnings in different sites of practice in the territory to construct profiles of physician practices using a multiple correspondence analysis associated with an ascending hierarchical classification. In Quebec, general practitioners can work in CLSCs, private clinics, long-term care facilities, short-term hospitals, outpatient clinics, home care programs, emergency departments or other settings.

## RESULTS

The study population included 145 family physicians; 80 lived in the territory (locally settled physicians), 24 were from the region but lived outside the Beauce territory (regional physicians), and 41 were from outside the region (locum physicians).

In the Beauce territory, 55.1% of physicians were locally settled, 16.6% were regional and 28.3% were locum physicians (Table 1). Table 1 lists physician characteristics by type of physician. Of the physicians, 46.2% did not work at all in primary care services (i.e., CLSC and private clinics). Conversely, 36.6% of physicians earned 75% or more of their income in primary care services. In this category were mostly locally settled physicians.

Figure 1 presents the source of income from

different practice settings, by type of physician. Locally settled physicians earned on average more than 60% of their incomes in primary care services (i.e., private clinics and CLSC). Regional and locum physicians earned more than 70% of their incomes in short-term hospitals and emergency departments.

Physician profiles, derived from the method described in the Data source section, resulted in 4 practice profiles. Figure 2 shows physicians' sources of income, by practice profile.

The "emergency practice" profile includes physicians who earn on average more than 80% of their income in emergency departments. The profile termed "hospital-based practice" is composed of physicians who earn on average more than 80% of their income from hospitals. The "multisite practice" profile includes practices in private clinics supplemented with practices in short-term hospitals and long-term care facilities. The "office-centred practice" profile is made up of physicians who share their time between private clinics and home visits.

Table 2 presents practice profiles by type of physician as well as other individual and practice characteristics. The emergency and hospital-based practice profiles are mainly composed of regional and locum physicians. The office-centred and multisite practice profiles are essentially composed of locally settled physicians. The emergency and hospital-based practice profiles include more women and younger individuals than the other 2 profiles.

## DISCUSSION

Our results show that the practices of locally settled physicians are very different from those of regional and locum physicians. Locally settled physicians are generally older and mostly practise in primary care. Regional physicians who have AMP obligations and locum physicians are similar: they are younger, work mostly in hospitals and emergency departments, and can often fill permanent vacant positions in hospitals; but they practise rarely or not at all in primary care that requires geographical proximity of physicians and patients.

"Hospital-based practice" physicians see the highest proportion of older patients ( $\geq 65$  yr). The reason for this is likely the high number of hospital admissions among people in this age group. Several studies have shown that management of elderly patients in primary care reduces the number of hospital admissions.<sup>2</sup> By virtue of their in-hospital

**Table 1. Characteristics of 145 physicians**

Characteristic	Physician type; % of physicians			Total, %
	Locally settled, n = 80	Regional, n = 24	Locum, n = 41	
All physicians	55.1	16.6	28.3	100.0
Sex				
Female	42.5	37.5	36.6	40.0
Male	57.5	62.5	63.4	60.0
Age, yr				
< 30	6.2	16.7	19.5	11.7
30–44	31.2	41.7	39.0	35.2
45–65	62.5	41.7	41.5	53.1
Income from primary care services, %				
0	20.0	75.0	80.5	46.2
1–49	3.8	8.3	0.0	3.4
50–74	25.0	0.0	0.0	13.8
75–100	51.2	16.7	19.5	36.6



practices and because they are from outside the territory, physicians in the “hospital-based practice” profile do not provide patient care management and follow-up, and thus do not contribute to reducing avoidable hospital admissions.

The “emergency practice” profile includes close to one-third of the 145 physicians practising in the territory. A similar province-wide study showed that emergency care provides relatively high accessibility to patients compared with the other groups.<sup>19</sup> Yet, with a progressive increase in the prevalence of patients with chronic diseases, planning of physician distribution should also focus on integration and continuity of care to meet the health needs of an aging population.<sup>2</sup>

The profile termed “multisite practice” seems to be well adapted to a rural context because physicians in this profile work both in primary care and hospitals. However, young physicians in this study are not adopting this practice profile, which may mean it is declining. Overall, the practices of physicians in rural areas do not favour primary care services because many physicians work mostly in institutions.

Basic primary care services are mainly offered by physicians aged 45 years or older who are established in the territory. These results raise concerns regarding the future supply of health professionals in primary care. A similar province-wide study showed that office-centred practice presents the highest level of continuity of care.<sup>18</sup> Yet, the traditional family physician model is dwindling.<sup>20–22</sup> If nothing is done, this model will disappear, because the oldest physicians make up the core of this group. This would have serious consequences on patient care management and continuity of care in rural areas.

Our findings confirm that the planning policies pertaining to physician distribution implemented in Quebec have yielded the expected results. The objectives of these policies were to overcome the lack of resources in health institutions in rural areas. Our results show that regional and locum physicians see many emergency and in-hospital patients. These initiatives apply more specifically to younger physicians who must perform a minimum of 12 hours of AMP per week in hospitals. This requirement does not encourage them to develop primary

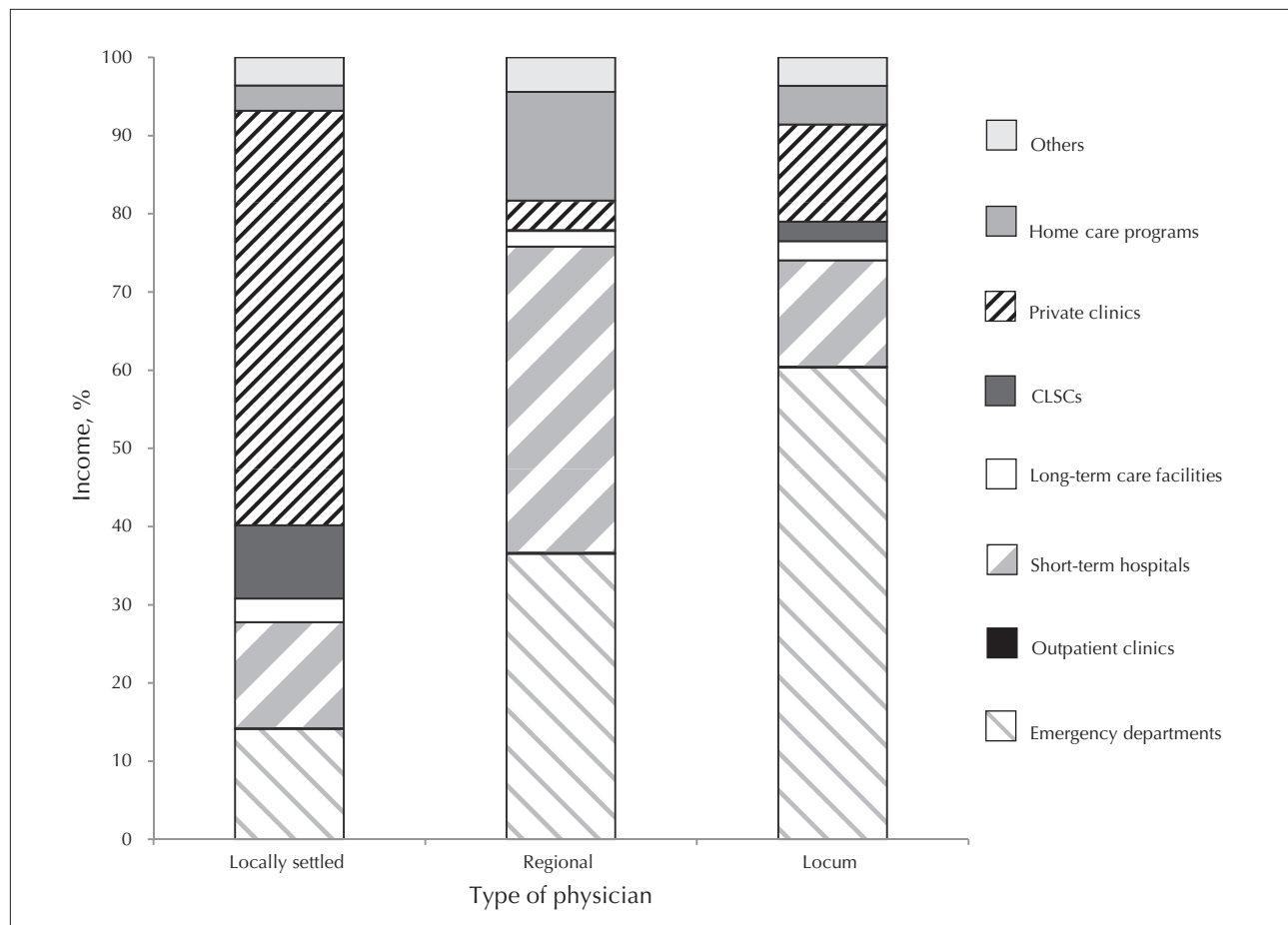


Fig. 1. Source of income by type of physician. CLSCs = centre local de services communautaires (local community health centres).

care practices. Conversely, older physicians are not affected by these policies, and our study shows that they are providing most of the primary care services in rural areas. Regional and locum physicians enable emergency departments and institutions to maintain their level of activity, despite the shortage of physicians in rural territories such as Beauce. In the short term, these policies have a beneficial effect on access to institutional care provided by hospitals and emergency departments in rural areas.

However, these policies have also had unexpected outcomes, as our study has shown. One of these outcomes is that young physicians practise more in institutions and less in primary care. According to Paré and Ricard,<sup>23</sup> there are more young physicians (64%) than experienced physicians (25%) in specialized care. There is a growing percentage of general practitioners in specialized care: it rose from 33.5% in 2003–2004 to 39% in 2006–2007.<sup>23</sup> Therefore, older physicians are providing most primary care services. There is a risk that patient care management and follow-up in primary care services will deteriorate over time. Moreover, when calculating the ratio of physicians to population to determine

physician supply in Beauce, the MSSS counts locum physicians and those who must complete AMP. Yet, these physicians are there on a temporary basis. They rarely, if at all, practise in primary care and do not provide patient follow-up or care management, in particular to patients with chronic illnesses. If no measure is applied to change this trend in the long term, these planning policies for physician distribution will have a very negative impact on the provision of primary care services. Complementary measures are needed to make primary care in rural areas a more attractive option for physicians.

In a society in which more patients increasingly require continuous and integrated care over time, the physician distribution policies implemented in Quebec do not encourage patient care management and follow-up of chronic illnesses in primary care, especially among young physicians who are required to work a certain number of hours in institutions.

To ensure that medicine in rural areas has a future and that continuing and accessible primary care services continue to be provided, it is important

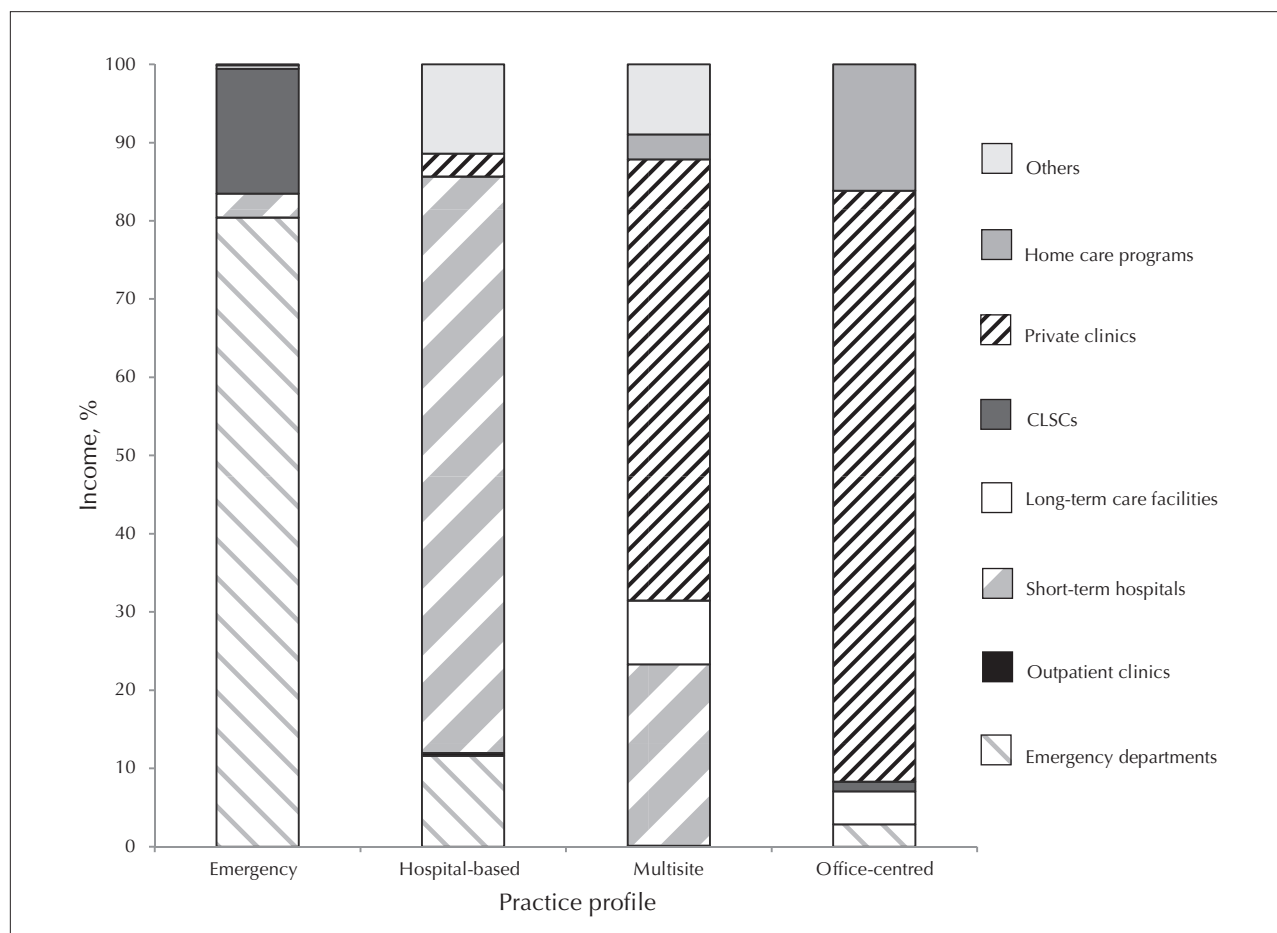


Fig. 2. Source of income by practice profile. CLSCs = centre local de services communautaires (local community health centres).

to implement other measures to encourage young physicians to practise in primary care. The literature shows that, although financial incentives are popular among younger physicians, close attention should be paid to the practice and lifestyle factors that appear to have greater importance.<sup>10</sup> Certain conditions and values similar to the concept of the “medical home” make primary care more attractive to young physicians,<sup>24</sup> but remuneration models supportive of this concept are not applied in Quebec. Only the FMG model implemented in Quebec in 2002 offers organizational and financial conditions that young physicians find interesting. Family medicine groups offer organizational and financial resources and conditions that are more beneficial than those found in traditional clinics, and they are likely to attract young physicians more easily. A report on the implementation and effects of FMGs shows that, in Quebec, it is easier to recruit physicians to FMGs than to traditional medical clinics.<sup>25</sup> But the conditions required for the acceptance and accreditation of FMGs by the MSSS are sometimes difficult to meet in rural areas, which may hinder their implementation. It is in the interest of decision-makers to adapt the conditions required for the implementation of FMGs in a rural context to strengthen primary care in rural areas.

## Limitations

Studies based on medical administrative databanks present both known strengths and limitations.<sup>26,27</sup> The data available to our study restricted our analyses. It would have been useful to have more information on the practices of locum physicians in their main regions of practice. Given that locum physicians tend to be in a younger age group, if their main practices were the same as in this rural area (i.e., emergency or hospital-based care), this would raise important concerns for patient care management and continuity of care, and more broadly for the future of primary care in Quebec. Overall, the situation prevailing in other rural areas in Quebec is not different from that presented in this study.<sup>19</sup> Our results could be extrapolated to other rural regions in Quebec or the rest of Canada, where the same conditions would apply.

## CONCLUSION

Physician distribution policies in rural regions raise a dual challenge. Health care institutions need physicians to maintain their level of service delivery, whereas primary care practices also require physicians to provide continuous and integrated care to

**Table 2. Characteristics of 145 physicians, by practice profile**

Characteristic	Practice profile; % of physicians*				Total, %
	Emergency	Hospital-based	Multisite	Office-centred	
All physicians	35.2	17.2	17.2	30.3	100.0
Locally settled physicians	29.0	36.0	96.0	73.0	55.0
Regional physicians	20.0	36.0	4.0	9.0	17.0
Locum physicians	51.0	28.0	0.0	18.0	28.0
Sex					
Female	47.0	56.0	36.0	25.0	40.0
Male	53.0	44.0	64.0	75.0	60.0
Age, yr					
< 30	20.0	28.0	0.0	0.0	12.0
30–44	55.0	28.0	52.0	7.0	35.0
45–65	25.0	44.0	48.0	93.0	53.0
Patient age group, mean % of patients					
0–18	20.0	8.0	21.0	16.0	17.0
19–64	56.0	37.0	54.0	60.0	55.0
65–74	10.0	14.0	8.0	11.0	10.0
≥ 75	14.0	39.0	15.0	12.0	17.0
Undetermined	0.0	2.0	2.0	1.0	1.0
No. of patients seen in Beauce					
< 999	79.0	76.0	16.0	41.0	54.0
1000–1799	13.0	0.0	28.0	25.0	18.0
1800–2399	2.0	18.0	32.0	14.0	14.0
> 2399	6.0	6.0	24.0	20.0	14.0

\*Unless otherwise indicated.

the population. Our results show that the policies implemented so far have given priority to institutional care at the detriment of primary care. A solution to that problem might be to create conditions for fostering the implementation of new innovative primary care organizations, such as FMGs.

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## Emergency medicine ultrasonography in rural communities

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**Introduction:** The Canadian Association of Emergency Physicians (CAEP) published a position statement in 2006 encouraging immediate access to emergency medicine ultrasonography (EMUS) 24 hours a day, 7 days a week. However, barriers to advanced imaging care still exist in many rural hospitals. Our study investigated the current availability of EMUS in rural communities and physicians' ability to use this technology.

**Methods:** A literature review and interviews with rural physicians were conducted in the summer of 2010 to design a questionnaire focusing on EMUS. The survey was then sent electronically or via regular mail in November 2010 to all Ontario physicians self-identified as "rural." Descriptive statistics and the Fisher exact test were used to analyze the data.

**Results:** A total of 207 rural physicians responded to the survey (response rate 28.6%). Of the respondents, 70.9% were male, median age was 49 years and median year of graduation was 1988. The respondents had been in practice for a median of 20 years and had been in their present community for a median of 15 years. More than two-thirds of physicians (69.5%) practised in communities with populations of less than 10 000. Nearly three-quarters (72.6%) worked in a rural emergency department (ED). Almost all (96.9%) reported having access to ultrasonography in the hospital. However, only 60.6% had access to ultrasonography in the ED. Less than half (44.4%) knew how to perform ultrasonography, with 77.3% citing lack of training. Of those using EMUS, 32.5% were using it at least once per shift. The most common reason to use EMUS was to rule out abdominal aortic aneurysm (58.3%). Most respondents (71.5%) agreed or strongly agreed that EMUS is a skill that all rural ED physicians should have.

**Conclusion:** Patients in many rural EDs do not have immediate access to EMUS, as advocated by CAEP. This gap in care needs to be addressed to ensure that all patients, no matter where they live, have access to this proven imaging modality.

**Introduction :** L'Association canadienne des médecins d'urgence (ACMU) a publié en 2006 un énoncé de position encourageant l'accès immédiat à l'échographie médicale d'urgence (EMU) 24 heures sur 24, 7 jours sur 7. Des obstacles à l'imagerie avancée persistent toutefois dans beaucoup d'hôpitaux ruraux. Notre étude a porté sur la disponibilité courante de services d'EMU dans les communautés rurales et sur la capacité des médecins d'utiliser cette technologie.

**Méthodes :** On a effectué, au cours de l'été 2010, une recherche documentaire et des entrevues auprès de médecins ruraux afin de concevoir un questionnaire portant sur les services d'EMU. Le questionnaire a été ensuite envoyé électroniquement ou par la poste, en novembre 2010, à tous les médecins de l'Ontario qui se sont décrits comme « ruraux ». On a utilisé la statistique descriptive et la méthode exacte de Fisher pour analyser les données.

**Résultats :** Au total, 207 médecins ruraux ont répondu au questionnaire (taux de réponse de 28,6 %). Parmi les répondants, 70,9 % étaient des femmes, l'âge médian s'établissait à 49 ans et l'année médiane de collation des grades, à 1988. Les répondants pratiquaient depuis une médiane de 20 ans et vivaient dans leur communauté actuelle depuis une médiane de 15 ans. Plus de deux tiers des médecins (69,5 %) pratiquaient

dans des localités de moins de 10 000 habitants. Près des trois quarts (72,6 %) travaillaient à l'urgence d'un hôpital rural. Presque tous (96,9 %) ont déclaré avoir accès à des services d'échographie à l'hôpital. Seulement 60,6 % avaient toutefois accès à des services d'échographie à l'urgence même. Moins de la moitié (44,4 %) savaient pratiquer une échographie et 77,3 % ont parlé du manque de formation. Parmi ceux qui utilisaient des services d'EMU, 32,5 % les utilisaient au moins une fois par quart de travail. Les répondants ont eu recours aux services d'EMU le plus souvent pour exclure l'anévrisme de l'aorte abdominale (58,3 %). La plupart des répondants (71,5 %) étaient d'accord ou fortement d'accord sur le fait que l'EMU constitue une compétence que tous les médecins des urgences rurales devraient avoir.

**Conclusion :** Dans beaucoup d'hôpitaux ruraux, les patients reçus à l'urgence n'ont pas accès sur-le-champ aux services d'EMU, ainsi que le préconise l'ACMU. Il faut chercher à combler cette lacune des soins pour assurer que les patients, sans égard à l'endroit où ils habitent, ont accès à cette technique d'imagerie qui a fait ses preuves.

## INTRODUCTION

Ultrasonography is a focused, goal-directed examination, which answers a binary (yes or no) question based on a specific clinical sign or symptom.<sup>1-4</sup> It is a safe, noninvasive and timely procedure, which requires no contrast media and no special patient preparation.<sup>5</sup> In practice, ultrasonography complements the physical examination by rapidly providing additional anatomic, functional and physiologic information.<sup>1</sup> Access to such information reduces risk by increasing diagnostic accuracy, diminishing the time to definitive therapy and minimizing complications that may arise from blind procedures.<sup>1,5</sup> A study conducted by Lyon and colleagues in 2005 examining the effects that emergency medicine ultrasonography (EMUS) had on decision-making in a rural emergency department (ED) determined that EMUS frequently clarified the clinical situation by reducing the potential number of differential diagnoses.<sup>6</sup> This clarification changed patient management in nearly three-quarters (74%) of cases.<sup>6</sup> Furthermore, in almost 10% of cases, EMUS actually suggested diagnoses not originally included in the differential.<sup>6</sup> Thus, EMUS improves health outcomes in acute care patients through the early identification of life-threatening conditions.<sup>3,5</sup> Indeed, it is the timeliness of this test that has made it invaluable to emergency medicine.

In Canada, EMUS is mainly used in 5 clinical situations: 1) identifying an abdominal aortic aneurysm (AAA), 2) identifying an intrauterine pregnancy, 3) assisting in central venous catheter placement, 4) identifying free fluid following trauma (focused assessment with sonography for trauma [FAST]), and 5) identifying a pericardial effusion.<sup>5</sup> In each of these 5 cases a rapid assessment is crucial, and having access to bedside EMUS makes

this possible. Furthermore, EMUS provides an alternative to transferring these potentially unstable patients outside of the ED for diagnostic testing.<sup>7</sup> It is for these reasons that the Canadian Association of Emergency Physicians (CAEP) published a position statement in 2006 encouraging EDs to offer EMUS 24 hours a day, 7 days a week.<sup>7</sup> However, barriers to this advanced imaging care still exist in many rural hospitals.<sup>6,7</sup> The purpose of the present study was to determine the access to, use of and opinions about EMUS in rural communities in Ontario.

## METHODS

A literature review<sup>5-15</sup> and interviews with rural physicians were conducted in the summer of 2010 to design a questionnaire focusing on EMUS. The survey was then pilot tested on 10 local physicians to acquire feedback on ease of use, and face and content validity. Their suggestions were used to modify the survey. The refined survey consisted of 7 demographic questions and 13 questions regarding EMUS availability and use. Questions were yes-or-no, multiple-choice or open-ended format. Contact information for all Ontario physicians self-identified as "rural" was obtained from the Ontario Medical Association (OMA). Depending on the information provided, the survey was sent either electronically, using SurveyMonkey, or via regular mail, in November 2010. Nonresponders were sent a reminder email 2 weeks later. As an incentive to complete the survey, respondents were entered into draws for an iPod nano and an iPod touch.

All statistical analyses were conducted using SAS Statistical Analysis Software Version 9.1.<sup>16</sup> Descriptive statistics and the Fisher exact test were used to analyze the data. Hypothesis tests were conducted

using a 2-tailed level of significance, with results declared significant at the 5% critical  $\alpha$  level. The University of Western Ontario's Research Ethics Board reviewed and approved the study proposal.

## RESULTS

### Respondents

Of the 725 surveys sent out, 207 were returned completed, resulting in a response rate of 28.6%. Respondent characteristics are summarized in Table 1.

### Survey responses

Table 2 outlines the responses to the survey. Of the respondents, 146 (72.6%) worked in a rural ED. Most of their hospitals (96.9%) had ultrasonography, but less than two-thirds of them had it in the ED. Furthermore, only 88 respondents (44.4%) knew how to perform ultrasonography.

### Stratified survey responses

When physicians were stratified based on their years of experience (group 1:  $\leq 10$ ; group 2: 11–20; group 3: 21–30; group 4: 31–40; group 5:  $\geq 41$ ), physicians with 10 or fewer years of experience

were most likely to know how to perform EMUS (54.8%) (Table 3). With increasing experience, the use of EMUS decreased, and the difference between these groups was significant ( $p = 0.003$ ). In general, the most common reason for not using ultrasonography in practice was a lack of training (85 physicians [77.3%]). Respondents were asked to select all answers that applied. A lack of equipment was the most frequently cited “other” reason for not performing ultrasonography. Responses that were listed as “other” within the survey but fit under one of the provided categories were included under the appropriate categories.

The Emergency Department Echo (EDE) course was the most common EMUS training program completed by respondents (60 physicians [59.4%]) and the American Registry for Diagnostic Medical Sonography course was the most popular “other” program. Of the physicians who worked in an ED, most (32.5%) performed ultrasonography at least once per shift, and ruling out AAA was the most common reason for such usage (70 citations [58.3%]). Sixty-nine responses (57.5%) also described “other” uses for ultrasonography, of which draining abscesses and identifying gallstones were the most common.

Almost half of all respondents strongly agreed that EMUS is a skill that they should have (67 physicians [46.9%]), and another 46 respondents (32.2%) agreed with this statement. Similarly, the most respondents either strongly agreed (56 physicians [38.9%]) or agreed (47 physicians [32.6%]) that EMUS is a skill that all rural emergency physicians should have. The Ministry of Health and Long-Term Care was the most common source selected to provide funding for EMUS training (58 physicians [40.8%]). However, when it came to providing the hardware, more than half of respondents (95 physicians [66.0%]) believed that the hospital should purchase its own equipment.

## DISCUSSION

Six years have passed since CAEP advocated for around-the-clock availability of EMUS in all EDs across Canada.<sup>7</sup> However, this has yet to become a reality in Ontario. Although almost all hospitals (96.9%) represented in our survey had access to ultrasonography, less than two-thirds (60.6%) had access within their ED. Furthermore, less than half of all respondents (44.4%) knew how to use this technology. Lack of training was identified as the greatest barrier to using ultrasonography in practice,

**Table 1. Characteristics of 207 respondents**

Characteristic	No. (%) of respondents*
Sex	<i>n</i> = 203
Male	144 (70.9)
Female	59 (29.1)
Age	<i>n</i> = 205
Median (range), yr	49 (27–80)
No. of years in practice	<i>n</i> = 206
Median (range)	20 (< 1–49)
No. of years practising in present community	<i>n</i> = 206
Median (range)	15 (< 1–47)
Year of graduation	<i>n</i> = 206
Median (range)	1988 (1955–2009)
Population of present community	<i>n</i> = 206
< 1000	10 (4.9)
1000–4999	75 (36.4)
5000–9999	58 (28.2)
$\geq 10\,000$	63 (30.6)
Distance to nearest referral centre, km	<i>n</i> = 206
< 50	68 (33.0)
50–99	65 (31.6)
100–199	39 (18.9)
$\geq 200$	34 (16.5)

\*Unless otherwise indicated.

with 77.3% of respondents reporting it as such. In an attempt to remove this barrier, CAEP recommended in their 2006 position statement that EMUS be incorporated into emergency medicine residency programs of the Royal College of Physicians and Surgeons of Canada and The College of Family Physicians of Canada.<sup>7</sup> In 2009, Woo and colleagues surveyed the directors of the 17 CCFP(EM) (Certificant of the College of Family Physicians [Emergency Medicine]) residency programs across Cana-

da and found that only 71.4% of programs offered introductory EMUS courses.<sup>5</sup> Moreover, only 60.0% of programs made these courses mandatory, and only 62.5% of the program directors believed that their residents acquired enough experience through these courses to perform EMUS independently and make the subsequent medical decisions necessary in practice.<sup>5</sup> Thus, even the training that is currently being offered in residency may not be sufficient to produce competent EMUS-trained physicians.

**Table 2. Survey responses of 207 respondents**

Question	No. (%) of respondents	Question	No. (%) of respondents
Work in a rural ED	<i>n</i> = 201	Perform ultrasonography ...‡	<i>n</i> = 120
Yes	146 (72.6)	< once per week	37 (30.8)
No	55 (27.4)	Once per shift	25 (20.8)
No. of ED shifts per month	<i>n</i> = 145	> once per shift	14 (11.7)
< 40	33 (22.8)	NA	44 (36.7)
41–80	53 (36.6)	Perform ultrasonography for ...‡	<i>n</i> = 120
81–120	46 (31.7)	Ruling out AAA	70 (58.3)
121–160	9 (6.2)	Ruling in intrauterine pregnancy	64 (53.3)
> 160	4 (2.8)	FAST	51 (42.5)
ED volume, patients per year	<i>n</i> = 176	Ruling out pericardial effusion	49 (40.8)
< 5000	12 (6.8)	Line placement	33 (27.5)
5000–9999	26 (14.8)	NA	38 (31.7)
10 000–14 999	47 (26.7)	Other	69 (57.5)
15 000–19 999	33 (18.8)	EMUS is a skill he or she should have‡	<i>n</i> = 143
≥ 20 000	58 (33.0)	Strongly agree	67 (46.9)
Ultrasonography in hospital	<i>n</i> = 192	Agree	46 (32.2)
Yes	186 (96.9)	Neither agree nor disagree	18 (12.6)
No	6 (3.1)	Disagree	4 (2.8)
Ultrasonography in ED	<i>n</i> = 193	Strongly disagree	8 (5.6)
Yes	117 (60.6)	EMUS is a skill all rural ED physicians should have‡	<i>n</i> = 144
No	76 (39.4)	Strongly agree	56 (38.9)
Know how to perform ultrasonography	<i>n</i> = 198	Agree	47 (32.6)
Yes	88 (44.4)	Neither agree nor disagree	25 (17.4)
No	110 (55.6)	Disagree	5 (3.5)
Don't perform ultrasonography because of ...*	<i>n</i> = 110	Strongly disagree	11 (7.6)
Lack of training	85 (77.3)	Should pay for EMUS training‡	<i>n</i> = 142
Difficulty maintaining skills	48 (43.6)	The Ministry of Health and Long-Term Care	58 (40.8)
Lack of need	24 (21.8)	The physician	32 (22.5)
Cost	13 (11.8)	The hospital	31 (21.8)
Other	21 (19.1)	Ontario Medical Association	6 (4.2)
Training in ultrasonography†	<i>n</i> = 101	The community	3 (2.1)
CAEP	15 (14.9)	Other	12 (8.5)
EDE	60 (59.4)	Should pay for the hardware‡	<i>n</i> = 144
Other	20 (19.8)	The hospital	95 (66.0)
None	6 (5.9)	The Ministry of Health and Long-Term Care	34 (23.6)
		The community	11 (7.6)
		The physician	0 (0.0)
		Ontario Medical Association	0 (0.0)
		Other	4 (2.8)

AAA = abdominal aortic aneurysm; CAEP = Canadian Association of Emergency Physicians; ED = emergency department; EDE = Emergency Department Echo; EMUS = emergency medicine ultrasonography; FAST = focused assessment with sonography for trauma; NA = not applicable.

\*Respondents were encouraged to select all applicable responses.

†Some respondents completed multiple training programs.

‡Responses from physicians who worked in an ED.



Those who have not acquired adequate EMUS training in residency must rely on additional training courses, such as EDE or the CAEP Emergency Department Targeted Ultrasound Roadshow. However, these courses are time-consuming, somewhat costly and require organization. The EDE course is offered to groups of 8–12 physicians, who arrange for a course instructor to provide hands-on training for a single day at a local facility.<sup>17</sup> The course is organized 2 to 3 months in advance and requires at least 1 month of preparation.<sup>17</sup> The CAEP course

is similar, except that it is offered in a specific location and physicians sign up individually.<sup>18</sup> Currently, these courses cost more than \$1000 per person and the physician is responsible for covering the expense.<sup>17,18</sup>

This may contribute to the cost barrier that was identified by 11.8% of respondents, especially when most did not believe they should be responsible for covering this fee. More than two-thirds (68.9%) of emergency physicians surveyed believed that the funding for EMUS training should come from another source, such as the Ministry of Health and Long-Term Care, the hospitals, the OMA or the community. However, funding is available to Ontario rural physicians to cover EMUS courses through the OMA for continuing medical education.<sup>19</sup>

Once physicians complete an EMUS training course, there is still a great deal of work that is required before they can obtain the title of “independent practitioner.” Fifty scans each must be completed assessing AAA, intrauterine pregnancy, free fluid in trauma and pericardial effusion, for a total of 200 scans. Maintenance of skills was a barrier to EMUS use for one-quarter of survey respondents. In rural areas, the minimum training requirements can be particularly difficult to achieve because of the lower volume of cases seen when compared with larger, urban centres. One of the ways to address this concern is to allow groups of trainees to individually assess stored scans as they are performed. This would allow physicians to complete their training in a much more timely fashion, as they would not have to wait until these 200 patients arrived in their EDs. Allowing physicians the opportunity to complete the training in a more reasonable time frame may encourage more individuals to enroll in these programs.

A lack of need was another barrier to using ultrasonography that was identified within this study. Indeed, 21.8% of respondents believed this technology was an unnecessary addition to their practice. This response was somewhat surprising, as almost one-third of respondents (32.5%) reported performing ultrasonography at least once per shift and an additional 30.8% performed ultrasonography occasionally (less than once per shift). Furthermore, it has been previously documented just how valuable EMUS can be to a rural hospital.<sup>6</sup> Such technology allows physicians in these settings to become more diagnostically self-sufficient, which may prevent patient transfers to larger centres with more radiologic services.<sup>6</sup> This, in turn, prevents tying up ambulances on patient transfers

**Table 3. Survey responses of 207 rural physicians, stratified by years of experience**

Question; group (years of experience)	No. (%) of respondents	<i>p</i> value*
Know how to perform ultrasonography	<i>n</i> = 197	0.003
Group 1 (≤ 10)	23/42 (54.8)	
Group 2 (11–20)	31/60 (51.7)	
Group 3 (21–30)	26/55 (47.3)	
Group 4 (31–40)	5/30 (16.7)	
Group 5 (≥ 41)	2/10 (20.0)	
Agree or strongly agree that EMUS is a skill he or she should have†	<i>n</i> = 142	0.026
Group 1 (≤ 10)	32/34 (94.1)	
Group 2 (11–20)	34/49 (69.4)	
Group 3 (21–30)	32/39 (82.1)	
Group 4 (31–40)	10/15 (66.7)	
Group 5 (≥ 41)	5/5 (100.0)	
Disagree or strongly disagree that EMUS is a skill he or she should have†	<i>n</i> = 142	0.41
Group 1 (≤ 10)	1/34 (2.9)	
Group 2 (11–20)	6/49 (12.2)	
Group 3 (21–30)	2/39 (5.1)	
Group 4 (31–40)	2/15 (13.3)	
Group 5 (≥ 41)	0/5 (0.0)	
Agree or strongly agree that EMUS is a skill all rural ED physicians should have†	<i>n</i> = 142	0.13
Group 1 (≤ 10)	28/33 (84.8)	
Group 2 (11–20)	31/50 (62.0)	
Group 3 (21–30)	30/39 (76.9)	
Group 4 (31–40)	9/15 (60.0)	
Group 5 (≥ 41)	4/5 (80.0)	
Disagree or strongly disagree that EMUS is a skill all rural ED physicians should have†	<i>n</i> = 142	0.78
Group 1 (≤ 10)	3/33 (9.1)	
Group 2 (11–20)	5/50 (10.0)	
Group 3 (21–30)	4/39 (10.3)	
Group 4 (31–40)	3/15 (20.0)	
Group 5 (≥ 41)	0/5 (0.0)	

ED = emergency department; EMUS = emergency medicine ultrasonography.

\*Derived from Fisher exact test.

†Responses from physicians who worked in an ED.

in areas that are lacking multiple crews.<sup>6</sup> Although teleradiology, which allows the transmission of diagnostic images between 2 facilities, may seem like an appropriate solution, it is hindered by interpretation delays.<sup>6</sup> When dealing with cases in which rapid diagnosis is imperative, such as AAAs or ruptured ectopic pregnancies, such delays are not acceptable.<sup>6,20-22</sup> Moreover, teleradiology can be very expensive.<sup>6</sup> Physicians who are adequately trained in EMUS could reduce their facility's expenses on teleradiology by preventing its use for unnecessary cases that could be easily remedied with EMUS.

As discussed previously, EMUS improves health outcomes in acute care patients,<sup>3,5</sup> which is likely why almost 80% of respondents in the present study agreed or strongly agreed that EMUS is a skill in which they should be competent. Furthermore, more than 70% of respondents agreed or strongly agreed that EMUS is a skill that all rural emergency physicians should have. Therefore, it would seem that reducing the barriers that are preventing physicians from undergoing this important training — including lack of training, difficulty maintaining skills, lack of need, cost and lack of equipment — would be a worthwhile step in improving patient care in rural Ontario.

## Limitations

This study is limited by its low response rate of 28.6%. In an attempt to increase the response rate, the number of open-ended questions was kept to a minimum. This decision ensured the brevity of the survey, but conversely restricted the richness of the data obtained. It is hoped that future studies can delve more deeply into the concepts that were introduced in this study.

## CONCLUSION

Patients in many rural EDs do not have immediate access to EMUS as advocated by CAEP. This gap in care needs to be addressed to ensure that all patients, no matter where they live, have access to this proven imaging modality.

**Competing interests:** None declared.

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## The occasional nonscalpel vasectomy

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**T**he nonscalpel method of doing vasectomies has been around since 1974 (in China) and 1985 in North America.<sup>1</sup> It has become the method of choice because it is minimally invasive and can be done in the office. A Cochrane review concluded that the nonscalpel method is also associated with less bleeding, infection and pain.<sup>2</sup> There are many small variations in the finer details of the procedure, and the following description is only one version of this procedure. The common areas for variations will be pointed out as they apply.

### CONSULTATION AND COUNSELLING

There are numerous reasons for a pre-procedure consultation, preferably not on the same day as the procedure. This is the time to find out the reasons for the procedure, counsel the patient on the risks and possible complications, and perform a physical examination. It is useful to explain the details of the procedure so that there are no surprises. An appointment is then booked for another day, which allows time for the patient to discuss the procedure with his partner and eliminates the risk of someone making a “spur of the moment” decision. I find it useful to give the patient a handout (with diagrams) that contains everything discussed during the consultation. I make sure to point out that the patient will not be sterile immediately after the procedure. This is because sperm is stored in the seminal vesicles (around the prostate), and these vesicles are on the “other” end of the procedure. The literature varies on how long it takes to

clear out the sperm, but it could take as many as 30 ejaculations to accomplish a sperm count of zero.<sup>3</sup> The average laboratory prefers to wait 3 months before testing a patient.

It is also useful to discuss reversal of vasectomies. I tell patients to think of it as a permanent procedure, as the chance of successfully reversing it is very low.

The following aspects are important points to cover during the history:

- Reason for request
- Number of children (from this relationship and previous relationships)
- Status of current relationship
- Previous infections, surgery or trauma in the scrotum
- Allergies
- Medication, for example, blood-thinning agents

The physical examination is mostly limited to the scrotal area. The presence of bilateral vas deferens should be determined as well as possible congenital abnormalities, signs of infection or other reasons for not being able to perform the procedure.

### CONSENT

Written and informed consent can be obtained at the consultation visit or preferably on the day of the procedure. This allows for another chance to go over possible complications (see “Complications”). The main question I ask is, “Are you sure you want to do this?”

### INSTRUMENTS

The instruments you will need are shown in Figure 1. You will also need lidocaine 1%–2% without epinephrine, a 6 mL syringe and a 30 G needle for

freezing. The reason for not using epinephrine is to recognize any bleeders instantly. You will need sterile towels for draping, a suitable cleaning solution and sample containers with formalin in it for pathology samples. I use an extra sterile glove to drop the cautery into. This way it can be reused in a sterile fashion by burning a hole through one of the fingertips (Fig. 2).

## PREPARATION

1. It is sometimes useful to lay a warm, wet towel on the scrotum while getting everything ready. This helps to relax the scrotum, which makes it easier to palpate the vas deferens.
2. I also let the cleaning solution stand in a container with warm water ahead of time for the same reason. When cleaning the area, thoroughly clean the penis as well as the area behind the scrotum. The penis often falls into the surgical



Fig. 1. Instruments needed for nonscalpel vasectomy (from bottom left): curved shearing forceps (1), ringed clamp (at least 1), clip applicator, cautery (battery or other); (from top left): at least 8 titanium clips, containers for cleaning solution, small scissors, small forceps (2).



Fig. 3. The grip for identifying and pinning down the vas deferens.

field and will have to be moved away.

3. Drape the area in the usual fashion, leaving an area where instruments can be laid down for easy reach.

## PROCEDURE

1. Identify the vas. The grip that is used to identify the vas deferens and to pin it down is shown in Figure 3. This might need some practice, but it is important, as the vas deferens is a muscular structure and can “move” around if not pinned down. The index finger is anterior and superior to the proposed incision site and the thumb inferior and anterior. The middle finger is behind the scrotum and helps to “lift” the vas up so that the vas is almost “tented” over the middle finger. The vas is identified by starting in the middle of the scrotum and moving (rolling) the thumb and middle finger laterally. The vas almost feels like half-cooked spaghetti.
2. Once the vas is pinned down, move the scrotal skin so that the raphe of the scrotum is overlaying the vas.



Fig. 2. Method of reusing the cautery in a sterile fashion.



Fig. 4. Infiltrating with local anesthetic agent.



3. Using a 30 G needle, freeze the skin halfway between the top of the testicle and the base of the penis and then insert the needle a bit deeper to freeze the vas (Fig. 4.) Most patients will feel a bit of a “kick in the groin” sensation when you freeze the vas. Make sure to inject enough freezing around the vas, almost as you would do for a digital ring block.
4. Using the sheering forceps, make a small hole in the scrotal skin and stretch it open to about 0.5–1 cm. Make the hold deep enough to ensure that the fascia underneath is also opened (Fig. 5).
5. At this point you will introduce the ringed clamp into the opening and grab the vas. It might be useful to slide the closed ringed clamp back and forth over your middle finger to find the “bump” that signifies the vas.
6. Open the clamp and “push” the vas into the clamp with your middle finger.
7. Close the clamp and pull the vas out of the wound. You can let go of your grip now.
8. Confirm that you have the vas in the clamp by feeling how the vas lifts up as you lift the clamp up (Fig. 6). Some physicians prefer to grab the vas through the skin before making an incision in the skin. Once the vas is secured in the ringed clamp, the sheering forceps are used to penetrate the skin and immediately go into the fascia surrounding the vas. From here the steps are the same as mentioned already.
9. There are several layers of fascia around the vas. These need to be stripped away using the sheering forceps (Fig. 7). I find it useful at this point to have another ringed clamp to grab the vas each time another layer is stripped away. Other instruments such as the sheering forceps, towel clamps and toothed forceps can also be used. Make sure all blood vessels are stripped away.



Fig. 5. Piercing the skin and stretching the wound open.

Smaller blood vessels can be swiped away with a 2 × 2 gauze pad.

10. When all the layers are removed, use the sheering forceps to penetrate the tissue that is underneath the loop of the vas deferens, making sure not to injure any blood vessels.
11. Clamp the 2 ends with the titanium clips. I use 2 clips on each end, applied from 2 directions (Fig. 8). Some physicians use nonabsorbable suture material to tie off the ends.
12. Resect the piece in between the clips and send to pathology for confirmation (Fig. 9).
13. Cauterize the ends, making sure to obliterate the lumen (Fig. 10). At this point, some physicians will turn one end back on itself and tie it down with suture material, or let it slide back in its sheath and suture the sheath close (fascial interposition). This might be unnecessary if the clips were applied properly and the lumens destroyed.
14. It is very important at this point to check for bleeding, as even the slightest oozing can lead to a grapefruit size scrotum afterwards (Fig. 11).



Fig. 6. Confirming that the vas deferens was clamped successfully.



Fig. 7. Stripping the layers from the vas deferens.



15. Relax the tension on the 2 ends of the vas to ensure there is no bleeding before letting the 2 ends slip back into the scrotum.

### THE OTHER SIDE

1. Before I start working on the other side, I give the patient a final chance to opt out of the procedure by stating that he could still father children with 1 vas deferens patent. (I have yet to have someone back out at this stage!)
2. To repeat the procedure on the other side, find the vas on the other side by changing hands, or by using the same hand and approaching the scrotum from the cephalic end of the patient.
3. Once you have the vas pinned down, slide the scrotal skin until the hole that you have already made lies over the vas. This way you can do both sides through the same hole. Just remember to freeze the other vas before you start!
4. Also remember to pierce the fascia on the other side with the sheering forceps before trying to grab the vas.



Fig. 8. Titanium clips applied to both ends of the vas deferens.



Fig. 10. Cauterizing the ends of the transected vas deferens.

5. Once you are sure there is no bleeding and both transected vasa are back in the scrotum, clean the wound and apply a bandage over the wound. It is usually not necessary to suture the wound, as it is small and contraction of the dartos muscles usually pulls the wound closed. A scab usually forms within 1 or 2 days.

### AFTER THE PROCEDURE

Again, the use of a handout is recommended, as we know how little patients remember of what we tell them, let alone after a stressful procedure. It is advisable to use ice packs on-and-off the scrotum for a few hours to minimize the risk of bleeding and swelling. I give the patients acetaminophen and ibuprofen to take in the clinic before they leave and recommend they take it afterwards as needed. No strenuous activity is advised for about a week. Although there is no definite recommendation, I also advise patients to abstain from sexual activity for about a week.

Again, stress the point that patients are not ster-



Fig. 9. Transection of the piece of vas deferens between the clips.



Fig. 11. Ensuring no bleeding before slipping the vas ends back in the scrotum.

ile right away. At this point, I talk about the postvasectomy semen analysis and arrange that it be done at least 3 months later. The most up-to-date recommendation is that only 1 sample is necessary, as long as it is more than 3 months after the procedure.<sup>4</sup> Sometimes you will get a result back that states, "few immotile sperm found." If the sample was a fresh one (within 4 hours of production), at least 7 months after the procedure and the sperm count is less than 10 000/mL, you can assume that the procedure was successful.<sup>4</sup>

## COMPLICATIONS

Possible complications include infection in the wound, bruising and swelling of the scrotum. Postvasectomy pain can occur and can be chronic. It is not known why some men have chronic pain after vasectomy. In a small percentage of men, small nodules develop in the vas at the vasectomy site. These are often sperm granulomas and can be excised if it is a cause of chronic pain. I warn patients about the potential for recanalization, although the risk is very low (0.05%).<sup>5</sup>

## A FINAL WORD

Many physicians might not feel comfortable performing a vasectomy on their own after reading this article. It might be helpful to find a colleague who performs vasectomies and request to assist them a few times to get a feel for the anatomy and gain confidence in the technique.

**Competing interests:** None declared.

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## Country cardiograms case 44

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reviewed.

A 63-year-old morbidly obese woman presents to the emergency department of a rural hospital with a history of repeated episodes of syncopal attacks for the past 2.5 years. These episodes have increased in severity and frequency over the last 3 weeks. She has a history of hypertension, hypercholesterolemia, hypothyroidism and obstructive sleep apnea. Previous treatment for sleep apnea with continuous positive airway pressure was not tolerated. The patient states that she typically passes out when she bends forward to put on her socks or pick up items from the floor, when she gets up from bed and sometimes when she is on the toilet. It never happens when she is upright. The episodes usually occur abruptly, without preceding warning

signs of presyncope or aura. She recovers within 5 minutes with no confusion afterwards. She has a history of occasional witnessed limb twitching and generalized body stiffness, frothy oral secretions and urinary incontinence during the syncopal episodes. During one episode she fell and twisted her left ankle. Her regular medications are nifedipine 30 mg daily, bisoprolol 5 mg daily, perindopril–indapamide 8 mg/2.5 mg daily, acetylsalicylic acid 325 mg daily and levothyroxine 0.075 mg daily. Her deceased mother had a history of obstructive sleep apnea and had a permanent pacemaker implanted.

The patient's initial 12-lead electrocardiogram is shown in Figure 1. The patient stays in the emergency department on the telemetry heart monitor,

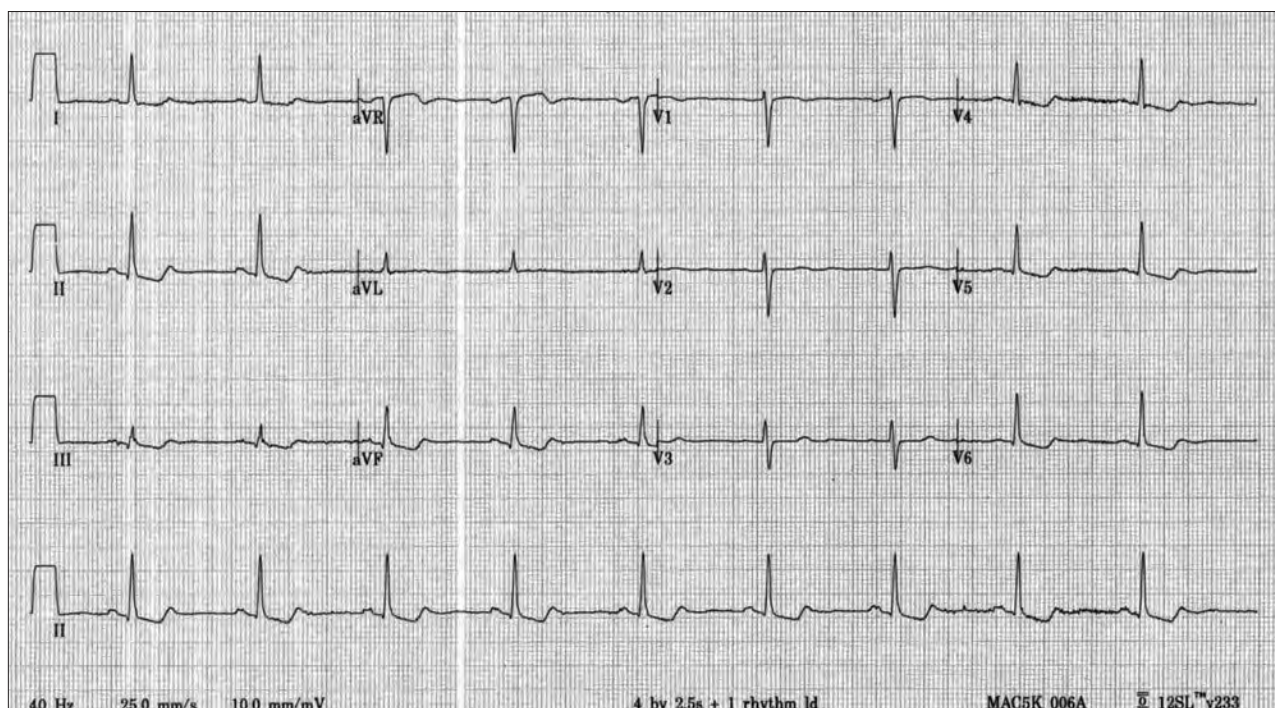


Fig. 1. Twelve-lead electrocardiogram of a 63-year-old woman with a 2.5-year history of syncopal episodes.



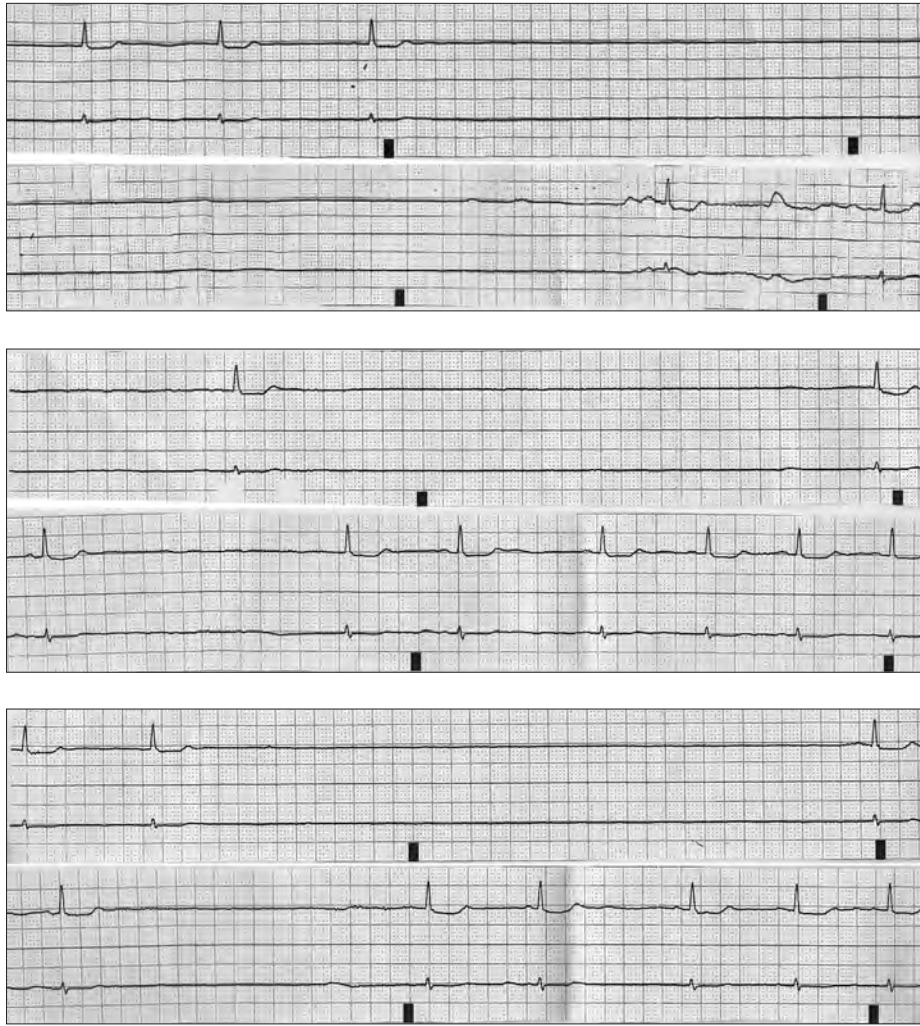


Fig. 2. Cardiac telemetry strips taken during sleep; the second strip in each panel is a continuation of the first strip.

and while she is sleeping her heart rhythm suddenly changes, as shown in Figure 2. What is your diagnosis?

For the answer, see page 112.

Competing interests: None declared.

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## Country cardiograms case 44: Answer

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**I**nitial electrocardiography (ECG) shown in Figure 1 (on page 110) shows normal sinus rhythm with ST-T changes compatible with chronic repolarization abnormalities rather than acute cardiac ischemia, especially considering that the patient did not report chest pain.

Her cardiac telemetry strips (Fig. 2, on page 111) show sinus bradycardia, changing to nodal beats and then asystole due to sinus node arrest. The sinus node arrest is shown as a flat straight line with no P wave or escape junctional or ventricular QRS complexes seen. The patient suddenly gasped and woke up. The strip showed that the rhythm gradually reverted back to sinus rhythm, her heart rate increased to more than 50 beats/min, the pause disappeared and the patient denied any symptoms.

She was admitted to the intensive care unit. Results of laboratory investigations, including complete blood count, electrolytes and thyroid function, were all normal. Troponin T levels were indeterminate on multiple tests, probably as a result of decreased coronary perfusion during the asystole episodes. Overnight, she had several episodes of the same rhythm of sinus bradycardia, progressing to nodal beats, then prolonged sinus node arrest with the longest lasting about 13 seconds (first strip panel in Fig. 2). The  $\beta$ -blocker she was taking for her hypertension was discontinued. A temporary transvenous pacemaker was inserted.

Repeat ECG showed 2 paced beats after the sinus beats (Fig. 3). At a referral hospital, a permanent transvenous single-chamber pacemaker was inserted with VVIR (ventricular pacing, ventricular sensing, inhibition response and rate-adaptive) mode.<sup>1</sup> No further asystole episodes were witnessed; the patient felt well and was discharged home.

The clinical presentation and the ECG findings were suggestive of malignant vasovagal syndrome.<sup>2</sup> The cardioinhibitory form of vasovagal or neurocardiogenic syncope is defined by a ventricular rate during syncope of less than 40 beats/min for longer than 10 seconds or asystole for longer than 3 seconds.<sup>3</sup> Malignant vasovagal syndrome occurs when there is a predominant asystolic-bradycardic component (cardioinhibitory type) in association with injurious and disabling frequent syncope.<sup>3</sup> This is usually diagnosed using the head-up tilt-table test, but the test wasn't required to confirm our patient's diagnosis. In malignant vasovagal syndrome the vagal tone increases during sleep and on bending forward. In our patient, these increases were exaggerated and caused her excessive bradycardia and sinus node arrest, with junctional and ventricular escape suppression.

Often this condition is mistaken for epilepsy, as acute brain hypoxia that occurs during prolonged asystole could trigger seizure-like activities. Conse-



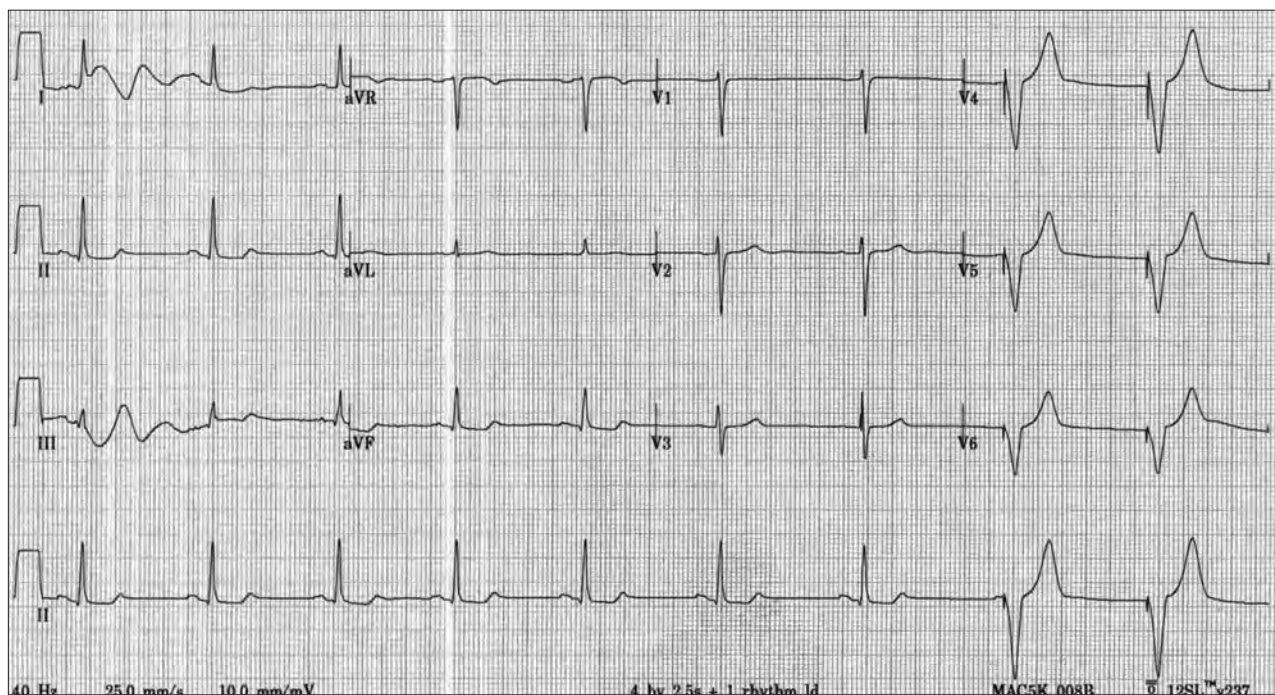


Fig. 3. Twelve-lead electrocardiogram after insertion of a temporary transvenous pacemaker.

quently, patients may be treated inappropriately with antiepileptic medications. The evidence is limited with respect to the management of malignant vasovagal syndrome, and the treatment should be tailored to the condition's severity and the patient's response to treatment.<sup>2-4</sup> The treatment can be in the form of pharmacologic management, such as discontinuing rate-limiting medications, or permanent pacing.<sup>3,5,6</sup> However, most cardiologists still prefer to implant a permanent pacemaker for patients with this syndrome, especially when the sinus node arrest is prolonged, frequent and causes injury,<sup>4</sup> as in our patient. Cardiologists often prefer a pacemaker with a rate-drop response algorithm.<sup>3</sup> Hayes reports that this feature of the pacemaker is

designed to minimize symptoms of neurocardiogenic syncope. If a patient's heart rate drops at a rapid rate or falls below a specific level (both adjustable parameters), a response is triggered in which the pacemaker will pace the heart at an accelerated rate (e.g., 100 beats/min) for a defined period of time (e.g., two minutes).<sup>1</sup>

This treatment will increase the cardiac output,

counter the hypotensive effect of vagal stimulation and minimize the symptoms.

**For the question, see page 110.**

**Competing interests:** None declared.

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