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VOLUME 18, N° 1, HIVER 2013

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Nature's Wisdom

Acrylic on canvas, 48" x 60", by Donna Andreychuk

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Donna's rural upbringing has influenced her art and her life. She calls upon those early years to express her interest in the Canadian landscape.

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A call for rural generalist surgeons

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Whereas access to rural generalist physicians remains a problem, an increasing problem is access to rural generalist surgeons. Patients living outside the metropolitan centres must increasingly travel long distances to receive surgical care. When surgery is elective, this causes substantial financial and emotional costs that at times can cause delay or even forgoing of the procedure. When surgery is needed for an emergency or trauma, this lack of access adds to poorer outcomes for rural patients.

Traditionally, the rural generalist surgeon has provided these important services in a timely fashion for rural communities. If we use the restrictive definition of “rural” offered by Statistics Canada, these communities comprised 19% of the population at the time of the 2011 Census. There are only 280 specialist surgeons in rural Canada, representing 3.2% of the total number of surgical specialists in the country (Lynda Buske, Director, Workforce Research, Canadian Medical Association, Ottawa, Ont.: personal communication, 2012).

Despite the decade that has passed since this issue was raised by the Canadian Association of Surgical Chairs,¹ the skills needed by rural generalist surgeons are no longer being taught. Many common and essential obstetric, gynecologic, urologic and orthopedic procedures are no longer seen by surgical trainees, whose training is increasingly less general.

This has 2 unfortunate side effects.

First, a more focused general surgical practice requires a greater population to sustain it. Second, access to these procedures might then require travelling farther to centres large enough to sustain call groups in all those subspecialties (i.e., large metropolitan centres that serve populations of more than 100 000).

But it doesn't have to be this way. Much of this essential surgical work can be done by rural family physicians using the full extent of their training. Family physicians in Canada are trained in a number of residency programs in the third year to do procedures such as cesarean deliveries, tubal ligations, vasectomies, common orthopedic surgeries and, at least in 2 programs, appendectomies.

It is also time that rural-orientated medical schools take control of their general surgical training programs to train for the needs of rural generalist surgery. Such training is already available in Northern Scotland² and in the United States in places such as the Mithoefer Center for Rural Surgery in New York (www.centreforruralsurgery.org). It should be available in a country as rural as Canada. It is not time — we are overdue.

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Demande de chirurgiens généralistes ruraux

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L'accès aux médecins généralistes ruraux demeure certes un problème, mais l'accès aux chirurgiens généralistes ruraux constitue un problème croissant. De plus en plus, les patients qui vivent en dehors des centres métropolitains doivent parcourir de longues distances pour recevoir des soins en chirurgie. Lorsque la chirurgie est élective, il en résulte des coûts financiers et émotionnels importants qui peuvent parfois retarder l'intervention ou même pousser le patient à y renoncer. Lorsqu'une intervention chirurgicale s'impose en cas d'urgence ou de traumatisme, ce manque d'accès rend encore plus médiocres les résultats pour les patients ruraux.

Le chirurgien généraliste rural a toujours fourni en temps opportun ces services importants aux communautés rurales. Si nous utilisons la définition restrictive de « rural » proposée par Statistique Canada, ces communautés comptaient 19 % de la population à l'époque du recensement de 2011. Le Canada rural compte seulement 280 chirurgiens spécialistes qui représentent 3,2 % de l'effectif total de spécialistes en chirurgie au Canada (Lynda Buske, directrice, Recherche sur les effectifs médicaux, Association médicale canadienne, Ottawa [Ontario] : communication personnelle, 2012).

Même s'il s'est écoulé une décennie depuis que l'Association canadienne des directeurs des départements de chirurgie a soulevé la question¹, on n'enseigne plus les compétences dont les chirurgiens généralistes ruraux ont besoin. Souvent, les stagiaires en chirurgie, dont la formation est de moins en moins générale, ne voient plus un grand nombre des interventions courantes et essentielles en obstétrique, gynécologie, urologie et orthopédie.

Il en découle deux effets secondaires

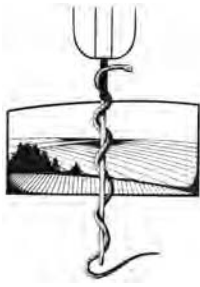
malheureux. Tout d'abord, un cabinet de chirurgie générale plus spécialisé a besoin d'un bassin de population plus important pour vivre. Deuxièmement, l'accès à ces interventions pourrait alors obliger à voyager plus loin vers les centres assez peuplés pour faire vivre de petits groupes dans toutes ces surspécialités (c. à d. les grands centres métropolitains qui desservent des populations de plus de 100 000 personnes).

Il n'est toutefois pas nécessaire qu'il en soit ainsi. Les médecins de famille ruraux utilisant toute leur formation peuvent se charger d'une grande partie de ce travail essentiel en chirurgie. Au cours de la troisième année de leur programme de résidence, les médecins de famille du Canada reçoivent de la formation sur certaines interventions, notamment césarienne, ligature des trompes, vasectomie, chirurgie orthopédique courante et, au moins dans deux programmes, appendicectomie.

Il est aussi temps que les facultés de médecine à orientation rurale prennent en charge leurs programmes de formation en chirurgie générale afin de dispenser de la formation qui répondra aux besoins de la chirurgie générale en milieu rural. Cette formation est déjà offerte dans le nord de l'Écosse² et aux États-Unis, à des endroits comme le Centre Mithoefer de chirurgie rurale à New York (www.centreforruralsurgery.org). Elle devrait être offerte dans un pays aussi rural que le Canada. Cela fait longtemps qu'il est temps de le faire.

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President's message. *Vox clamantis in deserto**

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Despite the dispirited-sounding title, this president's message is more upbeat than my previous two.

For many years, the SRPC has been a voice crying out in the wilderness on topics near and dear to the hearts of rural physicians and rural Canadians. These include equitable health care for rural communities, sustainable conditions for rural physicians, training for work in rural settings, enhanced skills training (e.g., anesthesia and surgery), socially accountable medical school admissions, rurally relevant continuing medical education and many more.

In some cases, our voice was heard and we made headway. In others, we have not seen much progress. In recent months, much activity has taken place and advances have been seen on various fronts.

In Whistler, BC, at the 20th Annual Rural and Remote Medicine Course, an Enhanced Surgical Skills (i.e., GP surgery) Group was established. This group of diverse individuals has made great strides under the capable leadership of Dr. Bob Woollard and Dr. Stu Iglesias and within the fold of the SRPC. Discussions were held with the Canadian Association of General Surgeons, The College of Family Physicians of Canada (CFPC), and the Australian College of Rural and Remote Medicine (ACRRM). Input was received from stakeholders such as the Alberta Rural Physician Action Plan and Rural Coordination Centre of BC. Support came from many quarters, some unexpected. Ongoing deliberations have made considerable progress. We are writing curricula and looking at accreditation, and have applied for Special Interests or Focused Practices standing from the CFPC. The field of enhanced surgical

skills has a new lease on life and is now like a runaway train — I like to think it is unstoppable.

After much soul-searching and discussion, the SRPC executive and ex-presidents have determined that a rural curriculum is needed to more fully equip future rural doctors for working conditions in rural and remote areas. Meetings in Thunder Bay, Ontario, with ACRRM, senior staff from the CFPC, and participants at the WONCA World Rural Health Conference were very enlightening. I feel the CFPC understands that this is a step that should be taken sooner rather than later. Now we have to work at finding the expertise, infrastructure, support and funding to take this essential leap of faith.

Another concern we have decided to address is socially accountable medical school admissions for rural students. We have an unassailable though unpopular viewpoint: that medical school admissions should mimic Canada's population distribution. On the grounds of social accountability we are on very solid footing, and we are receiving support from many quarters. This will need buy-in from the federal government and universities, and therein lies our work. It will not be easy, but it is too important to ignore.

We have a full load, and the road is steep and getting steeper. We will need agreement and support from our members in making a success of these new endeavours.

Ignore the title. Our voice is being heard and will grow stronger with your help. Make these issues your own and shout them from the rooftops.

Let us together empower the fellowship of the pitchfork!

*The voice of one crying out in the wilderness.

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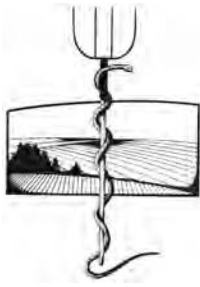
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Message du président. *Vox clamantis in deserto**

En dépit du titre qui semble désillusionné, ce mot du président est plus positif que mes deux précédents.

Depuis des années, la SMRC est la voix qui crie dans le désert au sujet des enjeux qu'ont à cœur les médecins ruraux et la population canadienne rurale. Ces enjeux comprennent les soins de santé équitables pour les communautés rurales, des conditions viables pour les médecins ruraux, la formation axée sur les contextes ruraux, l'amélioration de la formation professionnelle (p. ex., en anesthésie et en chirurgie), l'introduction d'une responsabilité sociale dans les admissions aux les facultés de médecine, l'éducation médicale continue pertinente pour les milieux ruraux, et j'en passe.

Dans certains cas, notre voix a été entendue et nous avons réalisé des progrès. Dans d'autres, les progrès ont été minimes. Au cours des derniers mois, il y a eu beaucoup d'activités et l'on a constaté des avancées sur divers fronts.

À Whistler, en C.-B., dans le cadre du 20^e cours annuel sur la pratique de la médecine en milieu rural et éloigné, on a mis sur pied un groupe technique chirurgical avancé (c. à d., en chirurgie pour les OP). Ce groupe de personnes diverses a réalisé de grands progrès sous la direction compétente des D^{rs} Bob Woollard et Stu Iglesias, et au sein de la SMRC. Il y a eu des discussions avec l'Association canadienne des chirurgiens généraux, le Collège des médecins de famille du Canada (CMFC) et l'Australian College of Rural and Remote Medicine (ACRRM). On a reçu des contributions d'intervenants comme le Programme d'action pour les médecins ruraux de l'Alberta et le Centre de coordination rurale de la C.-B. De nombreux milieux ont fourni leur appui dont certains étaient inattendus. Les délibérations en cours ont beaucoup progressé. Nous rédigeons des cursus et nous nous penchons sur l'agrément. Nous avons aussi demandé au CMFC le statut de pratique d'intérêt spécial ou spécialisée. Le domaine des techniques chirurgicales améliorées a connu un regain de vie et

ressemble maintenant à un train emballé — que j'aime à croire impossible à arrêter.

Après beaucoup de remises en question et de discussions, l'exécutif de la SMRC et les ex-présidents ont déterminé qu'un cursus rural s'impose pour doter les futurs médecins ruraux de compétences plus complètes pour les conditions de travail en région rurale et éloignée. Des réunions tenues à Thunder Bay (Ont.) avec l'ACRRM, des membres du personnel supérieur du CMFC et des participants à la Conférence mondiale sur la santé dans le monde de la WONCA ont été très enrichissantes. Je pense que le CMFC comprend qu'il s'agit d'une étape à franchir plutôt tôt que tard. Nous devons maintenant chercher à trouver le savoir-faire, l'infrastructure, le soutien et le financement nécessaires pour faire cet acte de foi essentiel.

La responsabilisation sociale des admissions aux facultés de médecine pour les étudiants des milieux ruraux constituent une autre préoccupation sur laquelle nous avons décidé de nous pencher. Nous avons un point de vue imprenable même s'il est impopulaire, soit que les admissions dans les facultés de médecine devraient refléter la répartition de la population du Canada. Pour des raisons de responsabilité sociale, nous nous trouvons sur une assise des plus solides et nous recevons l'appui de nombreux milieux. Le gouvernement fédéral et les universités devront être d'accord et c'est là dessus que nous devons travailler. Ce ne sera pas facile, mais c'est trop important pour ne pas intervenir.

Nous avons les mains pleines et la pente raide devient de plus en plus abrupte. Nous devons obtenir l'accord et l'appui de nos membres pour que ces nouveaux efforts aboutissent.

Oubliez le titre. Notre voix est entendue et sera plus puissante avec votre aide. Faites de ces questions les vôtres et criez-le sur les toits.

Conjuguons nos efforts pour donner du pouvoir à la communauté de la fourche !

*La voix qui crie dans le désert.

Perceptions of medical school among high school students in southwestern Ontario

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*This article has been peer
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Introduction: Canadian medical students are more likely to come from urban and high-income areas and to have well-educated, professional parents. Physicians who grew up in rural areas are more likely to serve in rural and lower-income areas. We identify perceptions held by rural high school students regarding the affordability and attainability of a medical education.

Methods: We distributed a survey to high school students who attended the MedQUEST Health Career Exploration Program in southwestern Ontario. The survey assessed socioeconomic background and perceived barriers to a medical education (including affordability as well as encouragement and discouragement from others).

Results: Of the 119 attendees, 106 (89.1%) completed the survey. Of the students who were interested in becoming physicians, most expected to fund their medical education through scholarships (56 [69.1%]), parental support (50 [61.7%]) or student employment (45 [55.6%]). However, less than half of all respondents (48 [45.3%]) provided reasonably correct estimates for annual medical tuition fees. If at least 1 parent had a postsecondary education, respondents were less likely to cite affordability as a barrier to attending medical school ($p = 0.05$).

Conclusion: Although students interested in obtaining a medical education cited affordability as a potential barrier, many were not aware of the actual cost of attending medical school. We found an association between perceived affordability of medical school and parents' level of education. To define this relation further, research is needed to collect more accurate data on family income. Students may benefit from more information about funding opportunities for medical school.

Introduction : Au Canada, les étudiants en médecine sont plus susceptibles de provenir de régions urbaines à revenus élevés et d'avoir des parents qui sont des professionnels instruits. Les médecins qui ont grandi dans des régions rurales sont plus susceptibles de travailler dans des régions rurales et à plus faible revenus. Nous avons relevé les perceptions des élèves de niveau secondaire en milieu rural face à l'accessibilité des études de médecine, y compris en termes de coût.

Méthodes : Nous avons distribué un sondage à des élèves du secondaire qui ont assisté au programme MedQUEST d'exploration des carrières en santé dans le Sud-Ouest de l'Ontario. Les questionnaires évaluaient la situation socio-économique et les obstacles perçus à l'endroit de la formation en médecine (y compris le coût et l'encouragement ou la dissuasion par autrui).

Résultats : Parmi les 119 participants, 106 (89,1 %) ont répondu au sondage. La plupart des étudiants intéressés à devenir médecins ont dit s'attendre à financer leurs études de médecine au moyen de bourses (56 [69,1 %]), d'une aide de leurs parents (50 [61,7 %]) ou d'un emploi d'étudiant (45 [55,6 %]). Toutefois, moins de la moitié de tous les répondants (48 [45,3 %]) ont donné une estimation raisonnablement exacte des frais de scolarité annuels des programmes de médecine. Si un des deux parents avait fait des études post-secondaires, les répondants étaient moins susceptibles de mentionner le coût comme obstacle à des études de médecine ($p = 0,05$).

Conclusion : Même si les étudiants intéressés par les études de médecine ont cité le coût

comme obstacle potentiel, beaucoup ignoraient le coût réel des études de médecine. Nous avons découvert un lien entre le coût perçu des études de médecine et le niveau d'instruction des parents. Pour préciser ce lien davantage, une recherche s'impose afin de recueillir des données plus précises sur le revenu des foyers. Les étudiants gagneraient à être mieux renseignés au sujet des bourses offertes aux étudiants en médecine.

INTRODUCTION

It has been well described that medical students in Canada differ substantially from the general population: they are more likely to come from urban and high-income areas and have well-educated, professional parents.¹⁻³ In recent years, there has been an intense focus on strategies to recruit and retain rural physicians; the recruitment of rural students into medical school has been a mainstay of several such strategies.⁴⁻¹⁵ Programs aiming to increase the quota of students from rural areas studying medicine have dichotomized students into categories of "rural" or "nonrural." However, these programs have neglected the complex interplay between rurality and socioeconomic status.

A 2001 study found that 29.1% of Canadian medical students came from a household with an income greater than \$120 000, which applies to only 4.9% of Canadian households.¹ Additionally, 39.0% of medical students' fathers had a master's or doctoral degree, as compared with 6.6% of the age-matched Canadian male population.¹ Evidently, medical students do not represent the economic composition of the general population.^{2,16,17} We are not aware of published research that dissects the socioeconomic status of medical students specifically from rural areas.

Kwong and colleagues² observed an increase in self-reported family income in students entering medical school in 2000 compared with those in 1997. This finding was thought to be associated with the large increases in tuition fees implemented over this period. Rising tuition fees, high application costs and travel expenses may all be prohibitive factors to students from rural or low-income areas. Additionally, participation in extracurricular activities, often looked for in medical schools' rigorous admission criteria, may be precluded by the need of a job. These factors are likely exacerbated by misinformation or lack of awareness about financial aid.^{18,19} It is also possible that applicants themselves are preselecting. A study conducted in the United Kingdom found that students with a lower socioeco-

nomic background greatly underestimated their chances of admission.²⁰ Students may perceive barriers to medical education that influence their choice to even consider a career in this field.^{17,21,22}

The distance to the closest postsecondary institution further compounds the effect of socioeconomic status. Frenette²³ has shown that the farther a student lives from a university, the more likely family income will affect the decision to attend university. Specifically, students living within 40 km of a university are 1.9 times more likely to attend university if they are from an upper-income family compared with those from a lower-income family. When the distance to a university is increased to greater than 80 km, students from upper-income families are 5.6 times more likely to attend university than students from lower-income families.

We must identify influences that encourage or discourage students from considering a career in medicine, both to ensure equal access to education and to aid in establishing a firm place for under-represented groups in medical school and health care.^{4,20,21} We address the existing gap in the literature regarding perceptions of medical education among Canadian high school students in rural areas. We included in our study perceptions about the costs of obtaining a medical education and how these influence students' perceptions of affordability.

METHODS

We developed written, closed-ended survey questions based on a literature review and consultation with experts. Questions in the survey targeted the following areas: socioeconomic status, perceived barriers to attending medical school, and affordability and financial aid. We used education level of parents as a proxy for socioeconomic status.

The target population was a convenience sample of high school students who took part in the MedQUEST Health Career Exploration Program during the summer of 2010. MedQUEST is a 5-day program in which high school students learn hands-on medical skills and have the opportunity to interact

with medical students and health care professionals. The program takes place in 6 rural or medically underserved communities in southwestern Ontario. Surveys were distributed to students on the first day of the program, before they had the opportunity to interact with the medical students or health care professionals.

We entered the anonymous data into a Statistical Package for the Social Sciences program. Analysis of the data included calculating frequencies and using cross-tabulation with the χ^2 test (95% confidence interval) to determine differences in the datasets.

RESULTS

Of the 119 students in attendance at the 6 MedQUEST locations, 106 completed the survey, for a response rate of 89.1% (Table 1). This included 11 (10.4%) students in grade 10, 42 (39.6%) students in grade 11 and 52 (49.1%) students in grade 12. The distance of each site from the closest medical school is shown in Table 1. Of the respondents, 93 (87.7%) planned to go to university after graduation from high school; no respondents planned to go directly into the workforce. Ninety (84.9%) had an average above 80% in the last completed year of school and 81 (76.4%) were interested in becoming a physician.

Table 2 shows the breakdown of parents' education. Most parents (156 [76.1%]) had completed postsecondary education at the college level or higher. In addition, 27 (25.5%) respondents had at least 1 parent who worked in an allied health profession or related career. Respondents' interest in a career as a physician did not differ significantly, regardless of their parents' level of education ($p = 0.5$) or parental occupation in a health care career ($p = 0.8$), as shown in Table 3.

Participants' estimates about the cost of medical school tuition per year in Ontario ranged from \$5000 to \$50 000. Less than half of participants (48

[45.3%]) estimated within a reasonably correct range (\$15 000–\$22 000 per year), and 33 (31.1%) were unsure about tuition costs. Knowledge of tuition costs did not vary with parents' education level ($p = 0.2$) or career in health care ($p = 0.4$).

Of the 81 students interested in becoming a physician, 57 (70.4%) participants felt that they would "definitely get in" or had a "good chance of getting in" when asked about their perceived chance of getting accepted into medical school. Of factors preventing these respondents from going to medical school, competitiveness of applicant pool (54

Table 1. Response rates of 119 high school students who took part in the MedQUEST Health Career Exploration Program and distance to closest medical school, by location

Location	No. (%) of respondents	Distance to closest medical school, km
Chatham-Kent County (Chatham)	16/19 (84.2)	84.7
Essex County (Leamington)	21/24 (87.5)	54.0
Huron-Perth County (Seaforth)	21/25 (84.0)	75.9
Middlesex County (Chippewa First Nation)	7/8 (87.5)	29.0
Oxford County (Mount Elgin)	13/13 (100.0)	66.0
Sarnia-Lambton County (Sarnia)	28/30 (93.3)	95.7

Table 2. Parents' highest completed level of education, as reported by respondents

Education	No. (%) of parents, $n = 205$
Did not complete high school	15 (7.3)
High school diploma	34 (16.6)
College diploma	74 (36.1)
Undergraduate degree	53 (25.9)
Graduate degree	19 (9.3)
Professional degree*	10 (4.9)

*For example, Doctor of Medicine, Doctor of Pharmacy, Bachelor of Laws.

Table 3. Interest in medicine and accurate knowledge of tuition costs among 106 high school students, by education and career of parents

Education and career of parents	No. (%) of respondents		
	Total	Interest in medicine	Knowledge of tuition
Postsecondary education			
Neither parent	14 (13.2)	9 (64.3)	4 (28.6)
One parent	27 (25.5)	21 (77.8)	12 (44.4)
Both parents	65 (61.3)	51 (78.5)	32 (49.2)
Career in health care			
Neither parent	71 (67.0)	54 (76.1)	32 (45.1)
One or both parents	27 (25.5)	21 (77.8)	13 (48.1)

[66.7%]), low grades (40 [49.4%]) and affordability (31 [38.3%]) were reported most often. Table 4 shows the education level of parents and anticipated barriers to attending medical school among all respondents. As a percentage of total respondents, affordability was more likely to be cited as a barrier to attending medical school if neither of the respondent's parents had a postsecondary education. Five (6.2%) participants reported that they did not feel they would "fit in" with classmates in medical school.

Responses about expected sources of funding for postsecondary education are summarized in Table 5. There was no difference in how participants anticipated funding an undergraduate education versus a medical education. The education level of parents significantly affected how respondents expected to fund their education.

DISCUSSION

By the age of 14–17 years, the Canadian high school students who participated in our study were already forming perceptions about entry into medical school. Three-quarters of participants reported interest in becoming a physician, years before the task of applying to medical school was upon them. However, we found that misconceptions or uncertainty regarding the cost of a medical education

were common among our respondents. These misconceptions may affect the perceived affordability and attainability of a medical education. Thus, to prevent self-selection out of medicine owing to fear about affordability, information about costs and financial aid programs should be promoted to high school students.

It remains to be seen whether the association between education level of parents and perceived affordability of medical school was because of low education levels or an associated low income. Part of the Ontario Student Assistance Program's (OSAP's) mission is to ensure that medical education is accessible to all students across Ontario.²⁴ However, a substantial proportion of students reported being unsure as to how they would fund their education. Relatively few participants expected to pay for their education using OSAP or bank loans, although this program is heavily used by medical and undergraduate students.^{1,25} About half of students graduating from Canadian undergraduate programs in 2005 relied on government or non-government student loans.²⁴ Data regarding loans in medical school are not currently available. However, it is likely that the proportion of students using loan programs such as OSAP will only increase because of cumulative educational costs and higher tuition fees.²⁵ Therefore, it must be determined

Table 4. Education of parents and anticipated barriers to attending medical school

Barrier	No. (%) of respondents; postsecondary education of parents		OR (95% CI)
	Neither parent, <i>n</i> = 9	One or both parents, <i>n</i> = 92	
Competitiveness of applicant pool	4 (44.4)	50 (54.3)	0.35 (0.09–1.43)
Low grades	5 (55.6)	35 (38.0)	1.32 (0.33–5.32)
Affordability	8 (88.9)	23 (25.0)	17.04 (2.01–144.4)
Won't fit in with peers	2 (22.2)	3 (3.3)	6.57 (0.93–46.2)

CI = confidence interval; OR = odds ratio.

*Values are missing for 5 respondents.

Table 5. Education of parents and anticipated sources of funding for postsecondary education

Funding*	No. (%) of respondents; postsecondary education of parents		OR (95% CI)
	Neither parent, <i>n</i> = 14	One or both parents, <i>n</i> = 92	
Scholarship	11 (78.6)	68 (73.9)	1.24 (0.33–5.03)
Parental support	3 (21.4)	64 (69.6)	0.12 (0.03–0.46)
Student employment	7 (50.0)	48 (52.2)	0.92 (0.30–2.82)
Bank loan	6 (42.9)	35 (38.0)	1.22 (0.39–3.82)
OSAP	7 (50.0)	24 (26.1)	2.83 (0.90–8.91)
Unsure	4 (28.6)	6 (6.5)	5.73 (1.38–23.8)

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

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whether affordability of medical school as a perceived barrier is because of a lack of information on available support or a true lack of resources.

Limitations

A major limitation in this study is that a substantial sample bias may be in place. The results may not be representative of high school students in general, because participants in MedQUEST have a pre-existing interest in health occupations and many already view medicine as a possible career option. The program's prerequisite of good academic standing may introduce socioeconomic advantage as a confounding factor, because students from lower income brackets tend to exhibit lower academic achievements.¹⁷ Therefore, barriers that may prevent students from applying to medical school may also prevent them from attending the MedQUEST program.

Respondents to our study were not representative of the general population. Based on data from the 2006 census report, 26.0% of the age-matched (35–64 yr) population in Canada had an education consisting of at least an undergraduate university degree compared with 77.4% of parents of our study's participants.²⁶ Students enrolled in MedQUEST were more likely to come from families with higher levels of education and health-related occupations. Interestingly, this is a similar skew to what is seen in medical school classes,¹ which may indicate that a self-selection process of students who view medical school as an option could begin at an even earlier age than high school.

An additional limitation is the need for more accurate proxies of socioeconomic status. A large income range may exist even within subsets based on education and type of career.

CONCLUSION AND FUTURE DIRECTION

There are many factors that may affect perceptions of medical education among high school students. We have shown that students' perceptions about their ability to pursue a career in medicine begin at least as early as the 11th and 12th grades, and perhaps earlier. Education and occupation of parents played important roles in influencing these students' views of the availability of a career in medicine. These findings are relevant to future endeavours that work to ensure access to care in rural and underserved communities (such as those represented by the MedQUEST locations).

We must identify, and take appropriate steps to

alleviate, the barriers that cause students to believe that medical school is out of their reach, financially or otherwise. To define these relations further, future research is required that targets a more representative population of students and collects more accurate data on family income. By identifying impressions regarding medical school in a specific population, this study has laid groundwork for future initiatives to dissipate misconceptions surrounding medical education.

Competing interests: None declared.

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CI = confidence interval; OR = odds ratio; OSAP = Ontario Student Assistance Program.

*Respondents could select all applicable sources of financial support.

were also more likely to practise in a rural area if older, male and in a relationship with someone who was also interested in living in a rural area. Importantly, an Australian study showed that medical graduates were likely to practise in a rural area if they had a partner with a rural background.⁴⁸ These students were also thought to have an appreciation for the rural atmosphere.⁴⁸

b. Elective experiences

Because of the underrepresentation of rural student applicants, medical school programs are currently promoting rural medical practice. This often involves the provision of core and elective rural rotations.

The balance between a student's positive and negative rural elective experiences has been repeatedly shown to influence a medical graduate's decision to practise in a rural area (Box 3^{9,10,19,37,39,49-56}).

These findings highlight the importance of placing students in rural settings where practices (and practitioners) are closely linked with academic program activities.⁵⁷ Although rural elective placements may be more agreeable to students who come from a rural background, the medical school must nevertheless consider aspects beyond the clinical realm.⁵⁸

c. Career aspirations

A longitudinal survey analysis conducted by med-

Box 2. Factors before medical school that affect future rural recruitment and retention

Canada

- Completion of high school in a rural area^{38*}
- Decreased proportion of rural students applying to medical school^{42,43†}

Australia

- Completion of high school in a rural area^{39*}
- Living in a rural community for at least 6 years during childhood^{40,41}
- Decreased proportion of rural students applying to medical school^{13,44‡}

*Canada and Australia have acted on this factor by having family medicine residents speak to high school students in rural communities in an effort to generate interest among students.⁴²

†Students with a rural background are not disadvantaged relative to students with an urban background when applying for entry to medical school. The decreased proportion of rural students applying to medical school is likely because of financial reasons.⁴⁵

‡Some progressive medical schools in Australia are making an effort to narrow the gap between medical school applicants with urban and rural backgrounds by adjusting an applicant's grade 12 entry score requirements to account for the rural student's "context score," which measures the degree of rurality and/or remoteness of the student's upbringing.

Box 3. Positive and negative predictors of graduates practising in a rural area

Positive

- Completion of undergraduate rotations in family medicine⁴⁹
- Completion of family medicine electives in rural regions⁴⁹
- The rural elective was perceived to be a positive experience by the medical student⁴⁹
- Completion of satisfactory electives in rural areas combined with having a personal and family rural background^{10,19,39,52,53}
- Exposure to appropriate rural elective terms⁵⁴
- Completion of elective terms in which clinicians acted as good role models⁵⁴
- Gaining an understanding of the needs of people living in rural areas⁵⁴

Negative

- Noting a lack of collegial support among rural general practices^{50,51}
- Lack of opportunity to take vacations for personal reasons or continuing medical education^{50,51}
- Undesirable on-call arrangements^{50,51}
- The misconception that rural practitioners are less qualified than urban specialists^{50,51}
- Unsatisfactory rural elective experiences³⁷
- Desire for a metropolitan lifestyle³⁷
- Having a partner who wants to live and work in a metropolitan environment³⁷
- Small rural hospital setting with underdeveloped infrastructure^{9,55}
- Elective experiences in which clinicians were reluctant to allow students to partake in procedural work^{9,55}
- Inadequate accommodation facilities^{9,55}
- Few social and recreational activities to enjoy⁵⁶
- Perceived difficulty in being accepted by the local community⁵⁶
- Remaining located far from family and friends over an extended period⁵⁶

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- Off Call articles: a grab-bag of material of general interest to rural doctors (e.g., travel, musings on rural living, essays) (1500 words or less).
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Recruitment and retention of general practitioners in rural Canada and Australia: a review of the literature

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Introduction: Both Canada and Australia are facing severe shortages of primary health workers, and these shortages are exacerbated in rural and remote communities. This literature review highlights similarities and explores the factors that serve to attract and retain family practitioners in underserved regions of Canada and Australia.

Methods: We used MEDLINE on OvidSP to review the literature between Jan. 1, 2000, and June 30, 2012. We excluded sources if the primary objective did not consider recruitment or retention of general practitioners.

Results: We found a total of 114 sources, 28 of which were excluded, leaving 86 sources for review. We organized results according to 5 life stages of family physicians in rural practice and graded the literature according to the strength of the methodology and the relevance of the findings. We chronologically categorized Canadian and Australian literature that discussed recruitment and retention of family practitioners into rural practice.

Conclusion: Various factors that pertain to each life stage of a family physician have been shown to positively correlate with the eventual decision to commence and remain practising in rural areas. Training programs should be better structured to attract candidates who are more likely to enter rural practice. Policy-makers should be mindful of these findings, because improvements in retention will deliver large financial savings.

Introduction : Le Canada et l'Australie font tous deux face à de graves pénuries de travailleurs en soins de santé primaires, pénuries qui sont exacerbées dans les communautés rurales éloignées. La recension des écrits met en évidence des similitudes et explore les facteurs qui servent à attirer et à fidéliser des médecins de famille dans les régions mal desservies du Canada et de l'Australie.

Méthodes : Nous avons utilisé MEDLINE sur OvidSP pour revoir les documents publiés entre le 1 janvier 2000 et le 30 juin 2012. Nous avons exclu les sources si leur objectif principal ne tenait pas compte du recrutement et du maintien en poste d'omnipraticiens.

Résultats : Nous avons trouvé au total 114 sources et nous en avons exclu 28, ce qui laissait 86 sources à analyser. Nous avons organisé les résultats en fonction de 5 stades de la vie des médecins de famille en milieu rural et nous avons coté les documents en fonction de la force de leur méthodologie et de la pertinence des constatations. Nous avons classé par ordre chronologique les communications canadiennes et australiennes où il était question de recrutement et de maintien en poste de médecins de famille en pratique rurale.

Conclusion : Il y a une association positive démontrée entre divers facteurs liés au stade de la vie des médecins de famille et la décision éventuelle de commencer à pratiquer en région rurale et d'y demeurer. Il faudrait mieux structurer les programmes de formation pour attirer des candidats plus susceptibles de se lancer en pratique rurale. Les stratégies devraient tenir compte de ces constatations parce qu'une meilleure fidélisation des médecins produira d'importantes réductions des dépenses.

ical school deans across Australia and New Zealand found that most medical graduates gravitate to metropolitan-based hospitals to complete internships, with few students choosing regional centres.⁵⁹ Furthermore, the creation of a model led the authors to suggest that medical students are most likely to practise in rural areas if they leave medical school with the following attributes: intentions of becoming a generalist, ample rural elective experiences and bonded scholarship agreement (i.e., the medical student accepts an offer for medical school enrolment in exchange for an undertaking to practise in an underserved region for a designated period). Conversely, the model predicted the opposite if students intended to specialize or if they were financially supported by their parents.

These findings are consistent with those of Veitch and colleagues,⁶⁰ who found that students were more likely to complete an internship in a regionally based hospital if they had substantial and meaningful rural elective exposure throughout the entire medical school program. This was even more likely if the student was from a nonmetropolitan area.⁶⁰

A qualitative study revealed that some Canadian students were often interested in family medicine even before the start of undergraduate medical studies.⁶¹ Coming from communities where practitioners were highly regarded and actively involved in community life was thought to be a factor contributing to this finding.

2. Community-based medical education

Abundant data show the importance of matching medical students to rural placements where they are likely to have a positive experience, irrespective of whether the student is from a rural area. However, equally important is the medical school's clerkship program as a whole and how this may influence a student's decision to practise in a rural area. Many of the rural clinical schools, including Canada's Northern Ontario School of Medicine and Australia's Flinders School of Medicine and James Cook University School of Medicine and Dentistry, all share the same socially accountable mission of providing a medical school curriculum that considers the health needs of the surrounding community.^{1,62} In these programs, the final 2 years of clinical education are integrated in the rural/regional setting, as opposed to the traditional model, in which the core rotations of the various specialties are completed in large, metropolitan-based tertiary care centres. These programs are thought to be success-

ful because of their use of facilities based in rural areas, with committed and motivated preceptors, while remaining linked to the academic activities provided by the medical school. Furthermore, these programs ensure that students are placed in communities where they are likely to encounter clinical presentations that match core curriculum learning requirements.⁶³⁻⁶⁵ Similar findings were evident in earlier work that considered the viability of creating integrated clinical medical education opportunities for medical students in South Australia.⁶⁶

3. Experiences during postgraduate training

Canada and Australia differ in the immediate options available for medical graduates entering postgraduate training pathways. Canadian graduates apply directly into a specialty training program and, on entry, immediately begin their specialty training. Australian graduates must first complete a year of internship, in which the doctor is employed as a hospital generalist with no specific specialty. A second year of work as a junior doctor is then required, before he or she can apply for a position in a designated training pathway. Despite these pre-registrar training requirements, the data suggest Australian interns may choose regional training experiences if they have been exposed to positive rural experiences and if they were educated in a school committed to serving underserved geographical areas.¹⁹ Hence, what is currently known about the relation between positive rural experience and a graduate's choice to intern in a nonmetropolitan hospital will likely have a positive impact on the recruitment of trainees into generalist programs in rural Australia. Evidence to support this hypothesis comes from a 2003 Australian retrospective cohort study that found bonded medical students who had agreed to complete 2 out of the 3 years of their initial postgraduate training in a rural location were more likely to be practising in a rural location more than 5 years later.³⁹

Another notable difference between Canada and Australia is the substantial remuneration paid in the Australian rural generalist training pathway that is not available in Canada.⁶⁷ Furthermore, the Australian College of Rural and Remote Medicine has developed a 4-year specialist training pathway toward a fellowship award. As such, trainees may complete their training while working at remote sites through the Remote Vocational Training Scheme.^{68,69} Conversely, many Canadian family medicine residency programs offer the standard

INTRODUCTION

Developed nations currently face severe shortages of medical workers and even greater maldistribution of primary health care services between metropolitan and rural regions.¹⁻⁵ The World Health Organization (WHO) acknowledges this problem by recommending that institutions train health professionals to address the priority health needs of the surrounding communities.^{4,5}

Canada and Australia have similarly low population densities with large geographical areas inhabited by relatively few people outside of urban centres.^{6,7} With both countries experiencing physician shortages, rural and remote communities are working hard to retain their current physicians, while creating innovative incentives to actively recruit and retain recently trained doctors.

Recently established undergraduate and postgraduate medical training programs have emphasized provision of health services in rural areas. These programs have generated interest among new family practitioners in providing services to rural and remote regions,^{1,8-13} although this interest is relatively recent and resides largely in newer graduates.

The ratio of registered family physicians to population in both countries is similar, with a more favourable ratio seen in metropolitan zones relative to regional and rural areas^{6,14-17} (Table 1). There continues to be a large maldistribution of family physicians in rural and remote areas of both countries, whereas urban regions continue to have increased recruitment and retention of medical practitioners in all specialties.^{5,18-22} Such trends are expected to reduce the number of Canadian and Australian doctors who serve aging rural populations.^{23,24}

Attempts at rectifying these disparities are being made in different settings and manners. For example, various Canadian provincial return-of-service agreements allow family physicians to work anywhere but in urban centres.²⁵ The Australian remedy was to create the Rural Incentives Program, which

offers financial incentives to undergraduate medical students, general practice registrars (i.e., family practice residents) and registered practitioners.²⁶ Research shows that key issues considered by practitioners when deciding to begin or maintain a rural practice include the availability of collegial support and links to the academic community,¹² the beauty of the rural environment,^{27,28} increased demand for procedural work,^{29,30} access to primary and secondary educational facilities, access to various social and recreational amenities, the availability of diagnostic and treatment facilities, and public and private remuneration offers.^{12,31-36}

In this literature review, we explore the factors that attract and retain family practitioners in rural and remote areas of Canada and Australia and highlight the similarities and differences between the countries. We also examine the rationale and successes of programs and policies, and make recommendations to address shortages of family physicians in rural areas.

METHODS

We conducted a literature review of original research and relevant meta-analyses to gain a better understanding of present knowledge about the recruitment and retention of family physicians in rural and remote areas. The definition of “rural and remote” varies, and we did not control for the definition of this concept.

We used MEDLINE on OvidSP to search for relevant publications from Jan. 1, 2000, to June 30, 2012. We used exploding keywords (i.e., terms used to initiate the literature search led to the inclusion of related key words) and the following medical subject headings: general practitioner, GP, doctor, family doctor, family practitioner, rural, remote, health, recruitment, retention, Canada, Australia, workforce and manpower.

RESULTS

We collected and analyzed a total of 114 sources. After further consideration of the inclusion criteria we excluded 28 sources, leaving 86 for analysis (Table 2).

Many of the sources were qualitative studies that examined the thoughts and opinions of key participants by means of one-on-one interviews or focus group discussion. Considerable data have also been collected using quantitative methods, such as questionnaires, to gather participant demographic and statistical information. The vast majority of

Table 1. Ratios of family physicians to population in Canada and Australia, by degree of rurality^{16,17}

Census area*	No. of physicians per 1000 population	
	Canada (1993)	Australia (1991)
Metropolitan	2.6	1.8
Regional	1.9	1.1
Rural/small town	0.9	0.9

*Metropolitan area population: > 100 000; regional area population: 10 000–99 999; rural/small town area population: 1–9999.

work in this field has been cross-sectional, instead of the preferred longitudinal method of analysis. This limitation remains unaddressed.

Determining what factors are important in the recruitment and retention of family physicians in rural and remote regions may be examined using a longitudinal approach.

Previous literature suggests that the analysis should consider all stages in a doctor's experience, including commencement of undergraduate medical school and establishment as a rural practitioner. We examine the 5 stages (Box 1³⁷) as follows, with a view to the literature.³⁷

1. Life before medical school

Research shows that various factors, including attributes pertaining to life before medical school, increase the likelihood that a medical graduate will decide to work in a rural or remote area. Much of this research was conducted in Canada and Australia (Box 2^{13,38-45}).

Whatever the cause, the enrolment pattern of Canadian medical students is of concern, with only 6% of medical students coming from rural regions and about 30% of Canada's population classified as "rural."⁴⁶ This discrepancy has been partially addressed in Australia, where in the year 2000, 25% of

all medical students country-wide were from a rural area.^{39,45} Although this figure is better than Canada's, it does not reflect the fact that 35% of Australia's total population resides in rural areas, again demonstrating ongoing underrepresentation of rural and remote areas.⁴⁰

2. Experiences during medical school

a. Demographics

Research has shown that, regardless of their rural elective experiences, some medical students are more likely than others to choose to practise in rural settings. Whereas many investigations have cited length of time spent living in a rural area before medical school as a strong corollary, Feldman and colleagues⁴⁷ found that Canadian medical students

Box 1. Life stages of a family practitioner in rural practice

1. Life before medical school
2. Experiences during medical school
3. Experiences during postgraduate training
4. Recruitment and retention after completion of fellowship qualifications
5. Maintenance action plan: remaining satisfied

Table 2. General inclusion and exclusion criteria

Category	Inclusion criteria	Exclusion criteria (no. excluded)
Type of report	<ul style="list-style-type: none">• Systematic reviews• Randomized controlled trials• Cohort studies• Cross-sectional descriptive studies	Anecdotal reports (9)
Themes	<ul style="list-style-type: none">• Single case studies• Recruitment and retention• General practitioners• Workforce turnover• Education program description*	<ul style="list-style-type: none">• Survey/method implementation• Allied health• Nursing• Social accountability (9)
Location	<ul style="list-style-type: none">• Australia• Canada• New Zealand• South Africa• United Kingdom• United States• "Rural and remote"†	Metropolitan‡ (1)
Publication date	Published between Jan. 1, 2000, and June 30, 2012	Published before Jan. 1, 2000, or after June 30, 2012 (9)

*Some sources described the elements of an undergraduate or postgraduate medical education program. These sources were included if the objective of the article was to highlight how education programs were increasing rural and remote recruitment and retention.

†The term "rural and remote" is used by many sources, but not controlled in this study. The distance from urban centres may therefore vary from one source to another.

‡Sources dealing with metropolitan workforces were excluded, unless the article compared this workforce with family practice in rural, remote and regional areas.

2-year training program, with options to complete an extra year of training in a specialty, giving the newly certified family practitioner additional focused training. The options available include obstetrics, anesthetics and emergency medicine.

The lack of a rural generalist training pathway may be one of many factors that explains why Canada has more difficulty with the recruitment and retention of doctors into rural areas. Rourke and colleagues⁴⁶ reported that 28% of family medicine training programs in Canada were designated rural, with only 10% of all family medicine doctors practising in rural areas. These figures demonstrate the underrepresentation of rural communities, considering that 30% of Canada's population lives in rural or remote areas.⁴⁶

At present, family medicine residency programs have, for the most part, created streams that permit students to elect whether to complete most of their training in either an urban or rural area. Similar to the Australian model, all Canadian family medicine training programs include a mandatory 2 months of rural service in an attempt to attract residents into rural medicine.⁷⁰⁻⁷² Unfortunately, the definition of what is deemed rural is left up to individual residency training programs, without any control measures in place. Chan and colleagues⁷⁰ surveyed Canadian doctors who had completed postgraduate family medicine training from 1991 to 2000, asking the doctors to state whether they were satisfied with their rural training experience. Median results showed that doctors who were unsatisfied with their level of rural training stated that they would have preferred at least 6 months of rural-based training. Conversely, doctors who were satisfied with their level of rural experience stated that 6 months was adequate exposure to rural medicine.⁷⁰

As is the case with medical students who have had positive experiences with rural electives, it follows that such experiences are more likely to increase recruitment of postgraduate trainees into rural practice, whereas negative experiences will have the opposite effect. Program directors should therefore consider the possibility that postgraduate rural training may not always be a positive experience for all trainees owing to differences in what communities can offer and other factors outside of one's control. Elliott and colleagues⁷³ explored the thoughts and expectations of Australian postgraduate trainees before and after their placement in a rural setting. The authors concluded that prerotation briefings on the possible negative aspects of rural rotations may increase success at recruiting

new doctors to rural medicine, even in the presence of subsequent negative experiences (Box 4).⁷³

As reported by Medves and colleagues,⁷⁴ the expectations of postgraduate trainees may differ depending on the individual trainee, what he or she is hoping to learn and gain from the rural rotation, and his or her personal circumstances. For example, a trainee who leaves home and a few friends may have a different experience than a trainee who leaves behind 3 children.⁷⁴

Female postgraduate trainees in Australia were surveyed to determine whether they were encouraged to stay in a rural area after they completed rural electives.⁷⁵ The researchers found that most of the trainees enjoyed the rural term, but those who did not were likely to remain in urban practice and tended to avoid rural practice (Box 5).

Comparison of data provided by Charles and colleagues⁷⁵ relative to that of Elliott and colleagues⁷³ suggests that one of the most important factors requiring attention to attract postgraduate trainees into rural practice is social isolation. Compensating

Box 4. Expectations before placement and experiences after placement of Australian postgraduate trainees⁷³

Expectations before placement

Positive

- Establishing good relationships with rural patients
- Rural lifestyle outside of practice
- Opportunity to work with specific rural supervisors

Negative

- Family issues
- Relocation logistics
- Dealing with emergency and trauma situations without much collegial support
- Lack of supervisor support

Experiences after placement

Positive

- Lifestyle was enjoyable
- Clinical presentations were challenging
- Supervisor level of support
- Social experience

Negative

- Separation from partner and family

Box 5. Positive and negative attributes of rural practice reported by female postgraduate trainees⁷⁵

Positive

- Ability to provide whole-patient and multigenerational care
- Nature of the clinical work is challenging and varied
- There is a sense of connectedness to the patient and the community

Negative

- Pressure to work full-time, a lot of on-call time and after-hours consultations
- Social isolation, away from family and friends

for this issue by attracting the family to the rural town, providing suitable housing and employment for the partner, and ensuring that the children receive quality education are some of the ways in which communities may be able to increase the recruitment of trained family practitioners.^{76,77}

4. Recruitment and retention after completion of fellowship qualifications

Investigations have cited many reasons as to why doctors may or may not choose to practise in rural areas (Box 6⁷⁸⁻⁸⁵). Much of this work has focused on recruitment efforts in the Australian and Canadian rural primary health care sector, but some work has also been conducted in the United States, the United Kingdom and South Africa, with similar findings reported.^{47,56,86}

Poor retention must be addressed to avoid problems inherent in frequent staff turnover if under-

served communities continue putting resources into recruiting family practitioners. Although the solution to a retention problem is specific to each individual community and what it has to offer, Rourke and colleagues⁸⁵ outlined a set of recommendations that were based on practitioner responses provided in a cross-sectional survey (Table 3). Chauhan and colleagues³⁴ had similar findings after surveying Canadian rural doctors (Table 4). Interestingly,

Table 3. Factors favouring retention of family physicians in underserved communities⁸⁵

Solution	Description
Medical education	<ul style="list-style-type: none"> • Trained rural clinical teachers • Undergraduate medical return-of-service agreements • Increased mandatory and elective postgraduate rural training opportunities • Advanced skills training • Continuing medical education
Rural practice	<ul style="list-style-type: none"> • Friendly specialist referral network via telephone, fax and Internet • Improvements in information technology with electronic databases of patient records • Access to allied health professionals • Increased remuneration • Improved call shift arrangements

Table 4. Reasons cited by family physicians for remaining in rural practice³⁴

Reason	Description
Incentives	<ul style="list-style-type: none"> • Cash incentives • Tuition repayment • Accommodation • Paid vacations • Assistance with finding spousal employment • Child daycare
Intrinsic value to practising and living in a rural area	<ul style="list-style-type: none"> • Opportunity to practise full skill set • Community has health needs that match career interests • Enjoyment of the rural lifestyle
Positive rural experiences during postgraduate training	<ul style="list-style-type: none"> • Very important for younger doctors relative to older doctors
Personal and professional satisfaction	<ul style="list-style-type: none"> • Recreational activities are abundant and enjoyable • Time away only possible with locum coverage
Improvements in opportunities for continuing medical education and continuing professional development	
Improved hospital infrastructure and availability of services	
Improved earning potential and regular work hours	

Box 6. Positive and negative correlatives associated with the recruitment of doctors into rural practice in Canada and Australia

Canada

Positive

- Positive rural experiences during postgraduate training^{18,34,78,85}
- Availability of financial incentives⁷⁹⁻⁸¹
- Partner satisfaction and integration into the rural community²⁷
- Access to desirable child care and education facilities²⁷

Negative

- Experiencing burnout in rural practice^{*34}
- Inability of partner to find employment in the rural community²⁷
- Difficulty in achieving a balance between having a professional relationship with the patient and a personal relationship with the community³³
- Excellent training received in rural areas, but long-term plan always included practising in urban regions because of one's family situation^{32,34}

Australia

Positive

- Adequate collegial support⁵⁷
- Desirable on-call arrangements⁵⁷
- Strong professional relationship with academic institutions⁵⁷
- Group practice arrangement with other clinicians (especially important for female physicians)⁸⁴
- Good variety of clinical presentations^{82,83}

Negative

- Perceived lack of collegial support^{82,83}
- Lack of undergraduate or postgraduate training in rural medicine^{82,83}
- Social isolation from family and friends²⁸

*A lack of locum coverage was found to place Canadian doctors at risk of burnout because of inability to take a personal holiday or attend sessions for continuing medical education. Despite this, financial incentives that aim to look after the doctor's family (e.g., accommodation, spousal employment and child daycare) may make the doctor more resilient to burnout.

many of these recommendations are congruent with several suggestions offered by South African rural doctors,⁸⁶ reflecting the commonalities of current intercontinental rural and remote medical workforce issues.

Social relationships are only one of many factors that can influence a practitioner's decision to leave rural and remote practice. Levels of satisfaction among practitioners have been the focus of work conducted by Gardiner and colleagues,⁸⁷ wherein questionnaires completed by doctors in South Australia revealed that almost 10% of sampled practitioners had expressed "quite a lot" of distress attributable to being in a rural practice. The vast majority of respondents reported being either "not at all" or "somewhat" distressed.⁸⁷

5. Maintenance action plan: remaining satisfied

The literature suggests that doctors who choose to remain in rural practice are very satisfied with their jobs. A Canadian cross-sectional survey of family practitioners working in small towns, regional areas and metropolitan centres found that those individuals who worked in small towns and rural areas were more satisfied with their practice arrangement relative to metropolitan doctors, despite being busier and having to accept a higher number of patients.^{31,88} Australian literature reveals similar results.⁸⁹ Box 7^{29,30,89-94} highlights the positive and negative factors that have been shown to contribute to a general practitioner's level of satisfaction while in rural practice.

Box 7. Positive and negative factors that contribute to the maintenance of a family practitioner's level of satisfaction

Positive

- Increased breadth of clinical presentations^{30,90}
- Increased demand for procedural work^{30,90}
- Working in a cohesive and supportive team environment within the rural practice⁹³
- A high sense of satisfaction among support staff at the practice⁹³
- Increased clinical and managerial autonomy^{89,94}
- Appropriate remuneration^{89,94}

Negative

- Lack of appreciation for services provided²⁹
- Poor relationships encountered with hospital administration and hospital-based clinicians²⁹
- Suboptimal remuneration²⁹
- Long working hours²⁹
- Poor on-call arrangements with other general practitioners in the area²⁹
- Inability to find locum coverage when wanting to take a vacation or undertake activities for continuing medical education^{91,92}

DISCUSSION

In this literature review we examined research that focused primarily on 5 stages in the professional development of a doctor. Although much of the research originated in Australia or Canada, similarities were found in recruitment and retention factors for family practitioners in underserved areas of countries such as the US, South Africa and the UK. The evidence strongly suggests that doctors are likely to start and continue practising rurally if they have spent a substantial part of their childhood formative years in a rural or remote area. This is an important factor that begs consideration by medical schools and postgraduate training programs working on the WHO recommendation for socially accountable medical education. Additionally, a curriculum that highlights the health needs of underserved communities, combined with enriching and desirable clinical placements at all training levels, positively correlates with rural recruitment and retention of doctors.

Solutions to the disparity between rural and urban services are complex and multifaceted. Moreover, doctors in rural practice become vulnerable to burnout owing to the high workload and low level of collegial support. Although perhaps this service disparity is inevitable, the provision of financial incentives, suitable housing, partner employment arrangements and access to childcare facilities could be effective countermeasures. As communities successfully recruit multiple doctors, the burden on individual health practitioners eases. Thus, better collegial support and after-hours arrangements, with increased opportunity for personal vacation and professional development, can be expected.

One literature review challenged the hypothesis that exposure to rural practice settings increases uptake of family practitioners into rural medical practice throughout the country.²⁶ These authors cited the variation in what defines "rural" and what constitutes "rural exposure," although they agreed that this limitation cannot be easily addressed.²⁶

Limitations

The limitations of the current literature review are common in research about family practitioner recruitment and retention: because of the nature of the field of research, no randomized control trials are available. Qualitative studies collected data by use of interview and/or focus group methodology. Most of the quantitative research used cross-sectional surveys, with very few using a longitudinal approach to data collection.

Therefore, longitudinal and high-quality cohort studies are required to further efforts to increase rural and remote primary health care delivery.

Most of the cited work was completed in either Australia or Canada, with a few sources from South Africa, the UK or the US. Whereas the objective of this review was to highlight the similarities and differences in recruitment and retention of family physicians into underserved regions of Australia and Canada, future work should make a stronger effort to compare other developed nations that have large rural populations.

CONCLUSION

The aging populations of rural and remote areas of Australia and Canada are in greater need of health care services. Strategies designed to increase the recruitment and retention of a general practice workforce into underserved regions of both countries cannot solely take into account the immediate factors that are thought to be important to doctors. Longitudinal efforts should be made at various points in the “making” of a family practitioner, beginning with steps to generate interest in pursuing a medical career among secondary school students through to practice certification and up to time of retirement. Medical education programs and underserved communities can both prosper when these factors are considered. Many opportunities for intervention exist at each stage of developing a doctor.

A direct comparison between the attitudes and behaviours of currently practising Canadian and Australian rural doctors should be made, as this will make more apparent the successes and failures of each country. Future work to look at the success of individual incentive programs is indicated if governments and communities are going to continue allocating resources toward the recruitment and retention of health professionals. Finally, further follow-up of the above highlighted educational programs is warranted to ensure continued refinement of socially accountable policies and initiatives.

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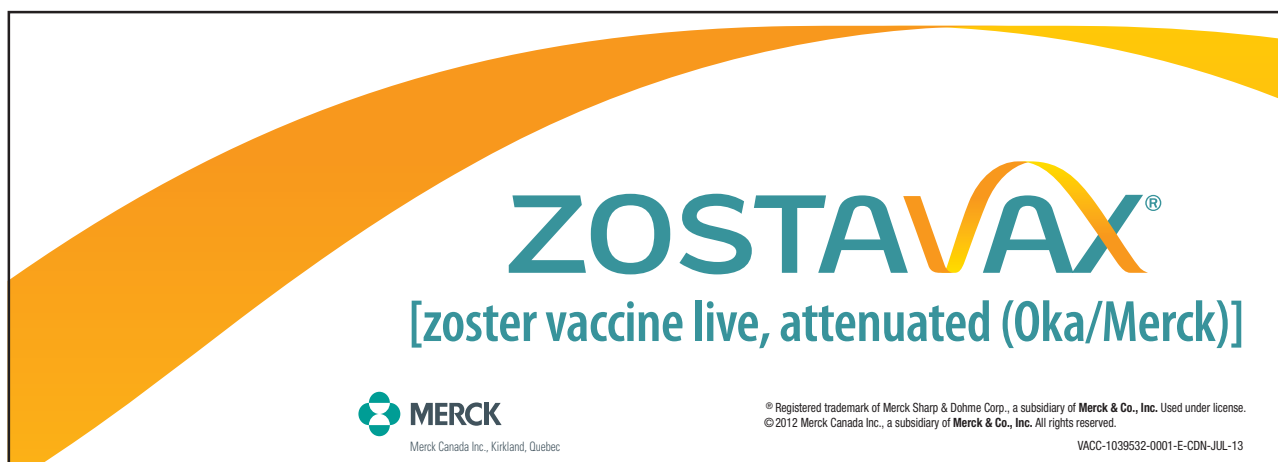
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OUT BEHIND THE BARN DANS LE FEU DE L'ACTION

CMAJ app for iPhones

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In a recent issue of the *Canadian Medical Association Journal (CMAJ)*, I saw an advertisement for a free new software application (app). It allows CMA members to read or download the full text of *CMAJ* articles to Apple-brand mobile devices. I downloaded and tested the app on my iPad, and wanted to share my experiences with other interested physicians to hopefully save them some time and effort.

CMAJ WEBSITE

The *CMAJ* website provides information about the app and how to register for access to *CMAJ* articles at www.cmaj.ca/cmajmobile. This page is also linked in a pop-up advertisement that appears on the CMA website (cma.ca).

HARDWARE AND SOFTWARE

The app is 3.7 megabytes in size and is currently only available for Apple iPad, iPhone and iPod touch devices using the iOS 4.2 (or later) operating system. It is not yet available for BlackBerry, Android or other devices.

CMAJ REGISTRATION

You must be a CMA member to access the articles. If you do not have a cmaj.ca login, you can create one as follows:

1. Go to www.cmaj.ca/cgi/activate/basic.
2. Enter your CMA membership number and click Submit.
3. Fill out the Subscriber Information and choose a username and password. The phone and fax numbers are required fields, but you can enter a "/" or "0" instead.
4. Click Send Form. An email will be sent to you, confirming the activation.

ELDER ABUSE & ZERO RESPONSIBILITY?

I'm a senior citizen (gimme my @\$% discount), and my older CMA membership number has only 5 digits. When the registration system did not recognize my number, I had to call CMA Membership Services to learn that we old folks now have to insert a zero at the start of the number to make it work (expletive deleted!).

DOWNLOADING THE APP

There were "App Store" icons on the *CMAJ* website that I expected to help me download the app, but they were not active links. I was able to download the app using my existing iTunes account and searching for "CMAJ."

ITUNES

Users of Apple mobile devices are told how to download this software program to their desktop or laptop computer when they first purchase the device. The program manages the connection between their computer and the mobile device. It provides access to the iTunes Store, where users can download a variety of apps (many are free) or music and video files.

INSTALLATION

I had no difficulty downloading the app to my desktop computer and then transferring ("syncing") it to my iPad. However, when I first downloaded a free app from iTunes, I was required by iTunes to provide a credit card number, even though there was no charge.

The occasional corneal foreign body

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This article has been peer
reviewed.

Sam is a 32-year-old man who was working on his 4×4 when he felt something enter his right eye. His tetanus vaccination is up to date. He presents to you, his rural doctor, asking for assistance. You proceed to examine and remove the corneal foreign body.

MATERIALS

The following materials are needed (Fig. 1).

- Topical anesthetic ophthalmic solution (e.g., tetracaine 0.5% or proparacaine 0.5%)
- Fluorescein strips or 2.0% solution
- Cotton-tipped applicator
- 3-mL syringe with 25-gauge needle or eye spud
- Loupe or slit lamp
- Cobalt blue light
- (Optional) rust ring burr or Alger Brush II Corneal Rust Ring Remover

PROCEDURE

Apply 2 or more drops of anesthetic to the affected eye by having the patient look up while you place drops onto the cornea or in a pocket of a retracted lower lid (Fig. 2).

Examine the eye for a loose foreign body using a loupe or slit lamp. Evert the upper lid using a cotton applicator to keep the proximal tarsus applied to the globe while pulling cephalad on the eyelashes (Fig. 3). Check under the lower lid by pulling down on the eyelashes.

Apply fluorescein to the eye and have the patient blink to distribute the stain evenly (Fig. 4).

Re-examine the globe for corneal abrasions and foreign bodies under cobalt blue light from the slit lamp or from a filter applied to an ophthalmoscope or transilluminator (Fig. 5). If a corneal foreign body is found, explain that you need the patient to remain still, and then use the eye spud or needle, approaching laterally, with the bevel up in a tangent to the cornea where the foreign body is sitting. Touch the edge of the foreign body with the spud (Fig. 6).

With a flicking motion away from the patient, dislodge the foreign body and use the cotton applicator to pick it up. If there is a remaining rust ring, you can use either a sterile dental burr (preferably a used one from the town's dentist because you don't want one that is too sharp) spun between your fingers or a battery-operated burr, to grind away any contaminated tissue (Fig. 7).



Fig. 1. Materials needed for removal of a corneal foreign body.



Fig. 2. Anesthetic drops.



Fig. 3. Everting the upper lid.



Fig. 4. Applying fluorescein to the eye.



Fig. 5. Re-examining the globe under cobalt blue light.

Historically, one would then patch the eye. However, studies now show that pain is reduced and function restored more quickly without patching.¹⁻³ I only patch if there is a very large abrasion for which the patient finds occlusion comfortable.

For pain control, oral analgesia usually suffices. Sometimes a topical nonsteroidal anti-inflammatory drug such as diclofenac 0.1% drops and/or a cycloplegic (for ciliary spasm) such as cyclopentolate 1% are needed.



Fig. 6. Touching the foreign body with the eye spud.



Fig. 7. Removing contaminated tissue with an Alger Brush.

This is also a good time to update tetanus status.

I advise patients to return the next day if the sensation of a foreign body is not completely gone or if their vision is not completely restored. In my experience, delayed healing occurs among patients scratched by evergreen needles. Patients should return if their eye shows signs of infection, which would warrant antibiotic drops.

CONCLUSION

Corneal foreign bodies are a common presentation to the rural physician. These can be dealt with easily in the doctor's office or the emergency department.

Competing interests: None declared.

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INTERNET CONNECTION

You need an active Internet connection for the mobile device to access *CMAJ*. I had no problem connecting using my wireless network at home.

INITIAL LOGIN

The app is accessed from a “CMAJ” icon on your device’s main menu. When you first use the app, you are shown a pop-up window asking for the username and password that you created during registration (see *CMAJ* Registration). Click Submit after entering the information. This pop-up window is part of the Settings tool in the app and must be closed manually using the Back, Settings and Done buttons to close all the windows. The app remembers your information and immediately connects to *CMAJ* on future visits.

GETTING HELP

To obtain help with the registration or download, call CMA Member Services at 888 855-2555 or send

an email to cmadata@cma.ca or pubsonline@cma.ca. At the time of writing, I could find no guide for new users built into the app or on the *CMAJ* website.

IBOOKS APP

To read articles at a later time, without Internet access, you can download articles as PDF files. You will need a PDF Reader app, such as iBooks (free from the iTunes Store), installed on the device. Downloaded articles are stored in iBooks with the long, obscure file name used on the *CMAJ* website.

FEATURES

The *CMAJ* app has the following features: “Favorites” for quick access to your favourite articles, previously viewed topic history, and incremental index searching for efficient topic access and SmartTabs for efficient navigation. These may be the subjects of a future article.

Competing interests: None declared.

Country Cardiograms

Have you encountered a challenging ECG lately?

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

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

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

Cardiogrammes ruraux

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

Dans la plupart des numéros du *JCMR*, nous présentons un ECG assorti de questions.

Les réponses et une discussion du cas sont affichées sur une autre page.

Veuillez présenter les cas, accompagnés d’une copie de l’ECG, à Suzanne Kingsmill, rédactrice administrative, *JCMR*, 45, boul. Overlea, C. P. 22015, Toronto (Ontario) M4H 1N9 ; cjrm@cjrm.net

Country cardiograms case 46

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This article has been peer
reviewed.

A 75-year-old man is brought by his wife to the emergency department of a remote BC hospital. He has a 3-day history of chest pain, which suddenly became much worse 4 hours ago. He is clearly in great distress and is writhing about and hitting his chest because the pain is so intense.

He has known ischemic heart disease, with previous inferior and anterior myocardial infarctions and stenting procedures, and has been compliant with maximal medical treatment. His nitroglycerin spray has been progressively

less effective in the past few weeks in preventing exercise-related chest pain.

His electrocardiogram is shown in Figure 1. A previous electrocardiogram, recorded 2 weeks earlier, is obtained for comparison (Fig. 2). It shows abnormal Q waves in inferior leads III and aVF, and very poor R wave progression in leads V1–V3, consistent with his known previous inferior and anterior myocardial infarctions. QRS duration in the previous electrocardiogram is 0.095 seconds. There is minimal ST segment elevation in lead II only; otherwise, there are no ST–T changes of note.

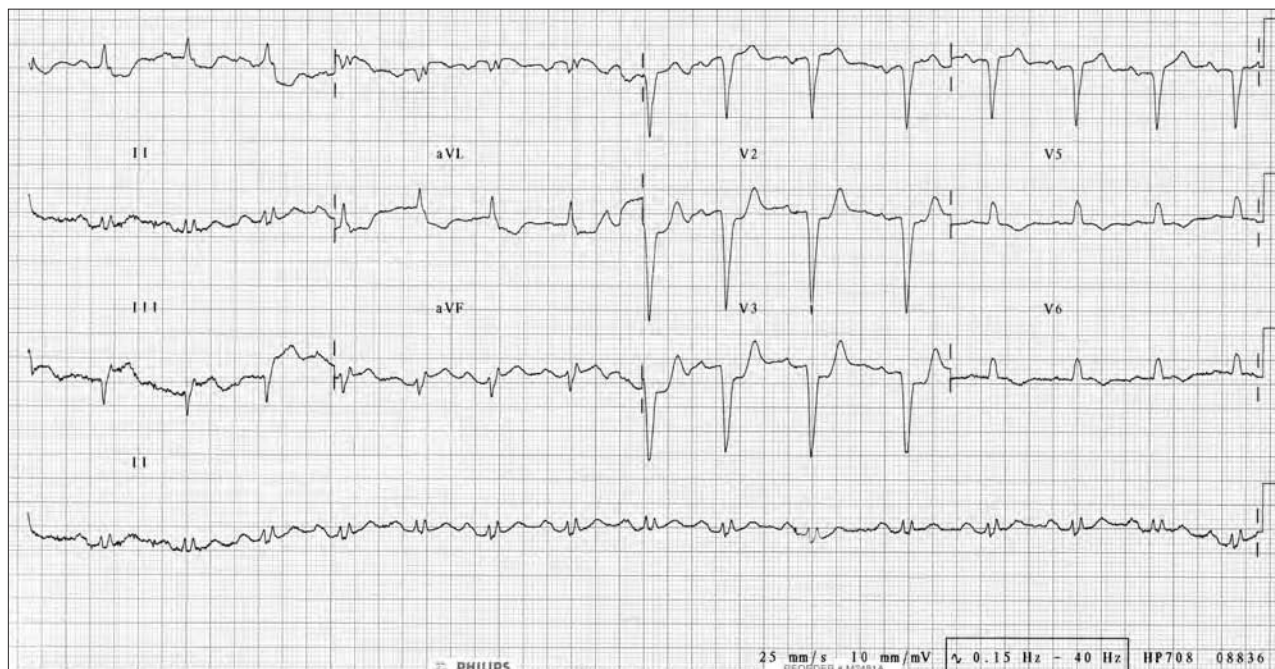


Fig. 1. Electrocardiogram of a 75-year-old man with a 3-day history of chest pain.

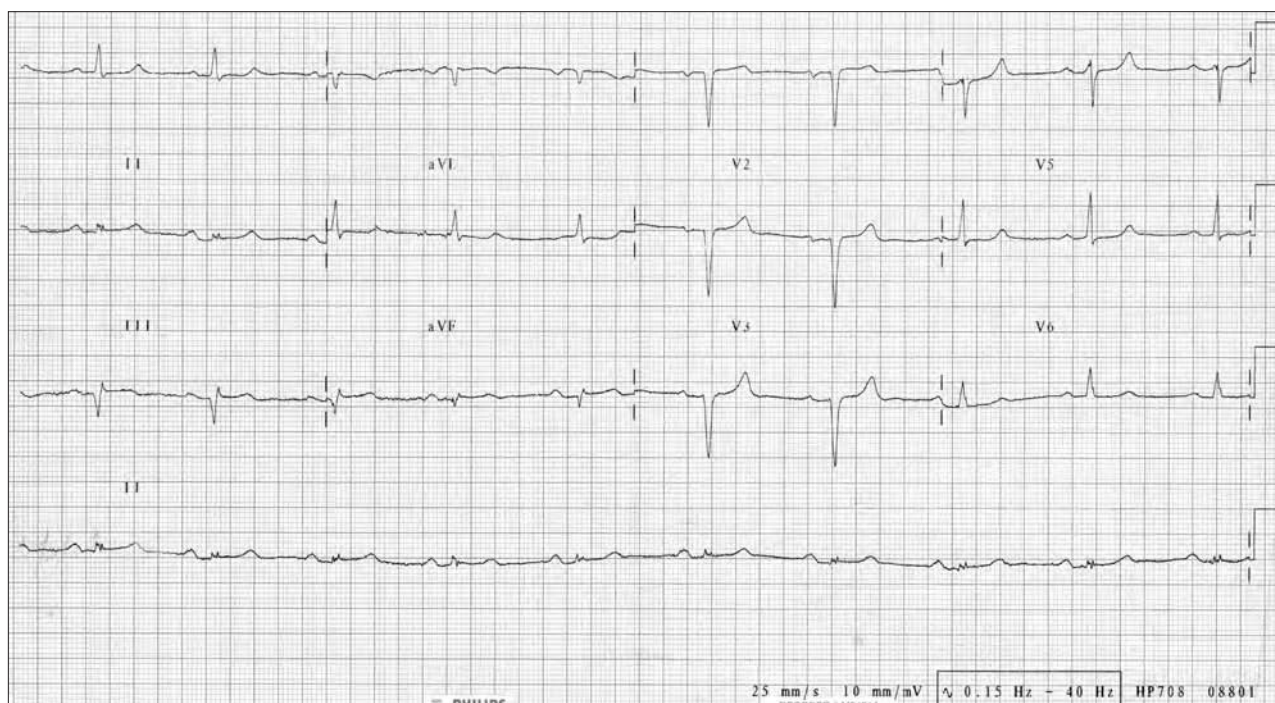


Fig. 2. Electrocardiogram recorded 2 weeks earlier showing abnormal Q waves in inferior leads III and aVF, and very poor R wave progression in leads V1–V3.

His initial troponin T level is reported as negative ($< 0.03 \mu\text{g/L}$).

Is there an indication for thrombolysis?

For the answer, see page 30.

Competing interests: None declared.

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Pour vous abonner au serveur de liste francophone, MedRurale, veuillez envoyer un courriel à l'adresse suivante : lamarche@comnet.ca.

Donner votre nom au complet et votre adresse de courriel. Si vous ajoutez aussi une courte biographie, elle pourra être affichée sur la liste en guise de présentation. Vous pouvez aussi accéder aux archives de MedRurale et à un formulaire d'inscription au serveur de liste anglophone sur la page d'accueil du site de la SCMR, srpc.ca.

Country cardiograms case 46: Answer

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Figure 1 (on page 26) shows normal sinus rhythm at a rate of 90 beats/min. PR interval is normal. Compared with the previous tracing, left atrial abnormality is present, and QRS duration has increased to 0.12 seconds. The axis is 0°. ST segment depression is seen in leads V2 through V6, I and aVL. ST segment elevation is present in leads III and aVF.

A QRS duration of 0.12 seconds or more in the presence of a deep, wide S wave or QS complex in lead V1 suggests a left bundle branch block (LBBB). However, caution is appropriate in diagnosing this. Because the duration is “borderline,” myocardial infarction may lead to slightly wider QRS complexes, and the QRS morphology in the 2 tracings is reasonably similar (other than in width).

This is important because LBBB that is known to be of new onset can be used as a criterion for thrombolysis if the clinical setting strongly suggests myocardial infarction. The changes of acute ST elevation myocardial infarction (STEMI) can be difficult to identify in the presence of LBBB, and the opportunity for early thrombolysis might thus be missed in such cases. Furthermore, patients with acute myocardial infarction and new LBBB have a higher mortality rate and may derive substantial benefit from thrombolysis. Against this benefit must be weighed the risks of thrombolysis in those who receive it unnecessarily.

Some clinicians may be hesitant to use the “new LBBB” criterion in this case. Can the ST–T changes be used to bolster the case for thrombolysis, even though LBBB may be present?

Indeed they can, and it is a common

misconception that LBBB inevitably obscures the changes of an acute STEMI. It is necessary, then, to know the typical ST–T changes associated with LBBB to recognize what is abnormal. Such ST–T changes are directed away from the QRS forces. The tall, wide, often notched positive QRS complexes typically seen in LBBB in leads I, aVL, V5 and V6, for example, are followed by down-sloping, depressed ST segments and inverted T waves. The ST segment elevation of an acute STEMI may be “cancelled out” by such ST segment depression, resulting in an ST segment that is close to the baseline. If ST segment elevation is seen in these leads, that would therefore be a significant abnormality.

By contrast, the typical deep S wave seen with LBBB in V1 and V2 is typically followed by ST elevation and a tall T wave. However, this elevation is “concave up,” in other words, not coved or “tombstone” in appearance. A coved, tombstone appearance in these leads would also be abnormal. Alternatively, in these leads if there is MI-induced ST segment elevation, it would be added to the LBBB-induced ST segment elevation. In the right clinical context, extreme ST segment elevation in these leads would therefore also suggest an anteroseptal STEMI pattern. ST segment depression in these leads would definitely be abnormal.

In Figure 1, considerable ST segment depression is present in leads V2 and V3. This clearly is an abnormal finding, which cannot be related to LBBB. It may represent an anterior ischemic pattern or posterior STEMI. In lead V3 the ST segment depression has a horizontal appearance, with an abrupt

transition to the onset of the T wave; this further strengthens suspicion of an ischemic process. By contrast, the ST–T changes seen in leads V5, V6, and leads I and aVL, appear to be consistent with LBBB.

The inferior leads display significant ST segment elevation in III and aVF, with a coved appearance that is more apparent in aVF. The reciprocal changes of ST segment depression seen in leads I and aVL are impressive but, as noted above, they may be secondary changes to LBBB and are therefore not of much use. A 15-lead electrocardiogram would be of further use and should always be obtained when

inferior myocardial infarction is considered.

These abnormal ST segment changes in leads III, aVF, V2 and V3 were considered substantial enough, combined with the clinical scenario, to proceed with thrombolysis. Follow-up testing of troponin T showed the level was significantly increased at 0.45 µg/L (> 0.10 µg/L is consistent with myocardial infarction).

For the question, see page 26.

Competing interests: None declared.

INSTRUCTIONS FOR AUTHORS

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

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

Material in the following categories will be considered for publication.

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

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

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

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

Cover: artwork with a rural theme

Manuscript submission

Submit 2 hard copies of the manuscript to the Editor, *Canadian Journal of Rural Medicine*, 45 Overlea Blvd., P.O. Box 22015, Toronto ON M4H 1N9, and an electronic version, preferably by email to cjrm@cjrm.net, or on CD. The preferred electronic version is an older Word format (in doc format such as Word 2003 or older — not docx). Digital art and photos must accompany the manuscript in separate files (see “Electronic figures and illustrations”).

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

Include a covering letter from the corresponding author indicating that the piece has not been published or submitted for publication elsewhere and indicate the category in which the article should be considered. Please provide the name and contact information of a potential independent reviewer for your work.

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LETTERS / CORRESPONDANCE

Please send us your comments and opinions. / Nous serons heureux de recevoir vos commentaires et opinions. Letters to the editor should be addressed to: / Prière de faire parvenir les lettres à la rédaction à l'adresse suivante : *CJRM*, 45 Overlea Blvd., P.O. Box 22015, Toronto ON M4H 1N9; fax 416 961-8271; cjrm@cjrm.net

ADVANCED CARE BY RURAL PHYSICIANS

Thank you for mentioning me in the Fall 2012 editorial¹ as someone who learned and applies a specialized skill (caudal epidural injection) not usually considered within the realm of expertise of rural physicians.

I was lucky that my first job as a family physician was with an older doctor who took the view that it was our job to provide what patients needed. He realized that low back pain was not

treated well and took it upon himself to learn some chiropractic techniques. That approach inspired me, so I did the same. I then expanded to various injection treatments as I saw the need. The longer a patient with back pain is off work, the less likely he or she is to ever recover. Therefore, prompt treatment is imperative. Waiting several months for an appointment at a pain clinic is simply no good, so the responsibility is on primary care physicians to provide the necessary treatment.

The philosophy of patient-centred care demands that we equip ourselves with whatever skills we need to provide that care, especially if those skills are not available elsewhere within a reasonable time frame.

David Howe, MB, FRCS, FCFPC, FRMRS
Parrsboro, NS

REFERENCE

1. Hutten-Czapski P. Occasional musings. *Can J Rural Med* 2012;17:119.

DOCTORS SPEAK OUT

Podium — Letters to the Editor — Editorials

We invite physicians to speak out on issues that concern them. Send your submissions to Suzanne Kingsmill, Managing Editor, *CJRM*, 45 Overlea Blvd., P.O. Box 22015, Toronto ON M4H 1N9; cjrm@cjrm.net

LES MÉDECINS S'EXPRIMENT

La parole aux médecins — Lettres à la rédaction — Éditoriaux

Nous invitons les médecins à commenter les questions qui les intéressent. Faites parvenir vos textes à Suzanne Kingsmill, rédactrice administrative, *JCMR*, 45, boul. Overlea, C. P. 22015, Toronto (Ontario) M4H 1N9; cjrm@cjrm.net

ZOSTAVAX®

[zoster vaccine live, attenuated (Oka/Merck)]



Prescribing Summary



Patient Selection Criteria

THERAPEUTIC CLASSIFICATION

Live, attenuated virus varicella-zoster vaccine

INDICATIONS AND CLINICAL USE

ZOSTAVAX® is indicated for the prevention of herpes zoster (shingles).

ZOSTAVAX® is indicated for immunization of individuals 50 years of age or older.

SPECIAL POPULATIONS

For use in special populations, see Supplemental Product Information, WARNINGS AND PRECAUTIONS, Special Populations.

CONTRAINDICATIONS

History of hypersensitivity to any component of the vaccine, including gelatin. History of anaphylactic/anaphylactoid reaction to neomycin (each dose of reconstituted vaccine contains trace quantities of neomycin). Neomycin allergy generally manifests as a contact dermatitis. However, a history of contact dermatitis due to neomycin is not a contraindication to receiving live virus vaccines.

Primary and acquired immunodeficiency states due to conditions such as: acute and chronic leukemias; lymphoma; other conditions affecting the bone marrow or lymphatic system; immunosuppression due to HIV/AIDS; cellular immune deficiencies. Immunosuppressive therapy (including high-dose corticosteroids); however, ZOSTAVAX® is not contraindicated for use in individuals who are receiving topical/inhaled corticosteroids or low-dose systemic corticosteroids or in patients who are receiving corticosteroids as replacement therapy, e.g., for adrenal insufficiency.

Active untreated tuberculosis.

Pregnancy (see WARNINGS AND PRECAUTIONS - Pregnant Women in the Supplemental Product Information).



Safety Information

WARNINGS AND PRECAUTIONS

General

The health care provider should question the patient about reactions to a previous dose of any varicella-zoster virus (VZV)-containing vaccines (see CONTRAINDICATIONS).

As with any vaccine, adequate treatment provisions, including epinephrine injection (1:1000), should be available for immediate use should an anaphylactic/anaphylactoid reaction occur. Deferral of vaccination should be considered in the presence of fever >38.5°C (>101.3°F). ZOSTAVAX® does not protect all individuals against the development of Herpes Zoster or its sequelae. See ACTION AND CLINICAL PHARMACOLOGY and CLINICAL TRIALS in the product monograph.

The duration of protection beyond 4 years after vaccination with ZOSTAVAX® is unknown. The need for revaccination has not been defined.

ZOSTAVAX® has not been studied in individuals who have previously experienced an episode of herpes zoster.

Transmission

In clinical trials with ZOSTAVAX®, transmission of the vaccine virus has not been reported. However, post-marketing experience with varicella vaccines suggests that transmission of vaccine virus may occur rarely between vaccinees who develop a varicella-like rash and susceptible contacts. Transmission of vaccine virus from varicella vaccine recipients who do not develop a varicella-like rash has also been reported and is therefore a theoretical risk for vaccination with ZOSTAVAX®. The risk of transmitting the attenuated vaccine virus to a susceptible individual should be weighted against the

risk of developing natural herpes zoster and potentially transmitting wild-type VZV to a susceptible contact.

ADVERSE REACTIONS

Adverse Drug Reaction Overview

In clinical trials, ZOSTAVAX® has been evaluated for general safety in more than 32,000 adults 50 years of age or older. ZOSTAVAX® was generally well tolerated.

ZOSTAVAX® Efficacy and Safety Trial (ZEST) in Subjects 50 to 59 Years of Age

In the ZEST study, subjects received a single dose of either ZOSTAVAX® (n=11,184) or placebo (n=11,212) and were monitored for general safety throughout the study. During the study, a vaccine-related serious adverse experience was reported for 1 subject vaccinated with ZOSTAVAX® (anaphylactic reaction).

All subjects received a vaccination report card (VRC) to record adverse events occurring from Days 1 to 42 postvaccination in addition to undergoing routine safety monitoring throughout the study.

Vaccine-related injection-site and systemic adverse experiences reported at an incidence of ≥1% are shown in Table 1. The overall incidence of vaccine-related injection-site adverse experiences was significantly greater for subjects vaccinated with ZOSTAVAX® versus subjects who received placebo (63.9% for ZOSTAVAX® and 14.4% for placebo).

Table 1: Vaccine-Related Injection-Site and Systemic Adverse Experiences Reported in ≥1% of Adults Who Received ZOSTAVAX® or Placebo (1-42 Days Postvaccination) in the ZOSTAVAX® Efficacy and Safety Trial

Adverse Experience	ZOSTAVAX® (N = 11,094) %	Placebo (N = 11,116) %
<i>Injection-Site</i>		
Pain†	53.9	9.0
Erythema†	48.1	4.3
Swelling†	40.4	2.8
Pruritus	11.3	0.7
Warmth	3.7	0.2
Hematoma	1.6	1.6
Induration	1.1	0.0
<i>Systemic</i>		
Headache	9.4	8.2
Pain in extremity	1.3	0.8

† Designates a solicited adverse experience. Injection-site adverse experiences were solicited only from Days 1-5 postvaccination.

Within the 42-day postvaccination period in the ZEST, noninjection-site zoster-like rashes were reported by 30 subjects (15 for ZOSTAVAX® and 15 for placebo). Of 21 specimens that were adequate for Polymerase Chain Reaction (PCR) testing, wild-type VZV was detected in 10 (3 for ZOSTAVAX®, 7 for placebo) of these specimens. The Oka/Merck strain of VZV was not detected from any of these specimens.

Within the same 42-day postvaccination reporting period in the ZEST, varicella-like rashes were reported by 115 subjects (64 for ZOSTAVAX® and 51 for placebo). Of 21 specimens that were available and adequate for PCR testing, VZV was detected in one of these specimens from the group of subjects who received ZOSTAVAX®; however, the virus strain (wild type or Oka/Merck strain) could not be determined.

Shingles Prevention Study (SPS) in Subjects 60 Years of Age and Older

In the largest of these trials, the Shingles Prevention Study (SPS), 38,546 subjects received a single dose of either ZOSTAVAX® (n=19,270) or placebo (n=19,276) and were monitored for safety throughout the study. During the study, vaccine-related serious adverse experiences were reported for 2 subjects vaccinated with ZOSTAVAX® (asthma exacerbation and polymyalgia rheumatica) and 3 subjects who received placebo (Goodpasture's syndrome, anaphylactic reaction, and polymyalgia rheumatica).

In the Adverse Event Monitoring Substudy, a subgroup of individuals from the SPS (n=3,345 received ZOSTAVAX® and n=3,271 received placebo) were provided vaccination report cards to record adverse events occurring from Days 0 to 42 postvaccination in addition to undergoing routine safety monitoring throughout the study.

Table 2: Number of Subjects with ≥1 Serious Adverse Events (0-42 Days Postvaccination) in the Shingles Prevention Study

Cohort	ZOSTAVAX® n/N %	Placebo n/N %	Relative Risk (95% CI)
<i>Overall Study Cohort</i>			
All ages	255/18671 1.4%	254/18717 1.4%	1.01 (0.85, 1.20)
60-69 years old	113/10100 1.1%	101/10095 1.0%	1.12 (0.86, 1.46)
≥70 years old	142/8571 1.7%	153/8622 1.8%	0.93 (0.74, 1.17)
<i>AE Monitoring Substudy Cohort</i>			
All ages	64/3326 1.9%	41/3249 1.3%	1.53 (1.04, 2.25)
60-69 years old	22/1726 1.3%	18/1709 1.1%	1.21 (0.66, 2.23)
≥70 years old	42/1600 2.6%	23/1540 1.5%	1.76 (1.07, 2.89)

N=number of subjects in cohort with safety follow-up

n=number of subjects reporting an SAE 0-42 Days postvaccination

The incidence of death was similar in the groups receiving ZOSTAVAX® or placebo during the Days 0-42 postvaccination period: 14 deaths occurred in the group of subjects who received ZOSTAVAX® and 16 deaths occurred in the group of subjects who received placebo. The most common reported cause of death was cardiovascular disease (10 in the group of subjects who received ZOSTAVAX®, 8 in the group of subjects who received placebo). The overall incidence of death occurring at any time during the study was similar between vaccination groups: 793 deaths (4.1%) occurred in subjects who received ZOSTAVAX® and 795 deaths (4.1%) in subjects who received placebo.

Vaccine-related injection-site and systemic adverse experiences reported at an incidence ≥1% are shown in Table 3. Most of these adverse experiences were reported as mild in intensity. The overall incidence of vaccine-related injection-site adverse experiences was significantly greater for subjects vaccinated with ZOSTAVAX® versus subjects who received placebo (48% for ZOSTAVAX® and 17% for placebo).

Table 3: Vaccine-Related Injection-Site and Systemic Adverse Experiences Reported in ≥1% of Adults Who Received ZOSTAVAX® or Placebo (0-42 Days Postvaccination) in the Adverse Events Monitoring Substudy of the Shingles Prevention Study

Adverse Experience	ZOSTAVAX® (N = 3345) %	Placebo (N = 3271) %
<i>Injection Site</i>		
Erythema†	35.6	6.9
Pain/tenderness†	34.3	8.6
Swelling†	26.1	4.5
Hematoma	1.6	1.4
Pruritus	7.1	1.0
Warmth	1.7	0.3
<i>Systemic</i>		
Headache	1.4	0.9

† Designates a solicited adverse experience. Injection-site adverse experiences were solicited only from Days 0-4 postvaccination.

The remainder of subjects in the SPS received routine safety monitoring, but were not provided report cards. The types of events reported in these patients were generally similar to the subgroup of patients in the Adverse Event Monitoring Substudy. Within the 42-day postvaccination reporting period in the SPS, the number of reported noninjection-site zoster-like rashes among all subjects was small (17 for ZOSTAVAX®, 36 for placebo; p=0.009). Of these 53 zoster-like rashes, 41 had specimens that were available and adequate for PCR testing. Wild-type VZV was detected in 25 (5 for ZOSTAVAX®, 20 for placebo) of these specimens. The Oka/Merck strain of VZV was not detected from any of these specimens.

The number (n=59) of reported varicella-like rashes was also small. Of these varicella-like rashes, 10 had specimens that were available and adequate for PCR testing. VZV was not detected in any of these specimens. The results of virus testing in subjects with varicella-like and zoster-like rashes should be interpreted with caution due to the number of samples that were not available for testing.

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Send all box number replies to: Box _____, *CJRM*, 1867 Alta Vista Dr., Ottawa ON K1G 5W8.

INTERIOR HEALTH OPPORTUNITIES

GENERAL PRACTITIONER/GP ANESTHETIST: BC – Creston. Two permanent family practice positions available in Creston. Come live among the cherry orchards and vineyards. This position would appeal to someone looking for the perfect mix of rural practice and country lifestyle. Small modern group practice facility. ACLS required. Anesthesia, surgical and obstetric skills are desired. Full-time, part-time or locum doctors guaranteed to be busy. Excellent remuneration, numerous incentives and reimbursements. For more information contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-278

FAMILY PHYSICIAN: BC – Nakusp. Come and live the peaceful life that you have always wanted on the shores of the pristine Arrow Lakes and surrounded by a hiker's paradise. Nakusp offers a close community and rural environment that you only read about. This friendly village of 1,524 is perfect for people who want a slower pace of life. Hiking through great cedars on the weekend, lounging on the beach with your family, taking in the spa with your partner, or visiting the local hot springs by yourself, Nakusp offers something for everyone. Eligible for MOCAP funding and numerous other incentives. Fee-for-service. Approximately \$300,000 per annum. For more information contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-279

GENERAL INTERNIST: BC – Salmon Arm. We are seeking a general internist to join two other general internists with subspecialty interests in the beautiful Shuswap region of British Columbia. Salmon Arm is a four-season destination city. The Shuswap boasts a high quality of life for families, retirees, and business. Salmon Arm is home to a satellite campus of Okanagan College. Visitors come for our clear and warm lakes, golf, hiking and cycling, winter sports, agri-tourism and the arts. Shuswap Lake General Hospital is a 40-bed facility with two OR's, a modern CT, echocardiography and new Emergency Department. Community Level 2 ICU with three beds. Current staff hold UBC clinical appointments hosting medical students, residents, and GIM Fellows. On call: 1-in-3. Work hours: variable. Fee-for-service. Estimated remuneration: \$400,000. Low overhead. Additional incentives available. For more information contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-280

FAMILY PHYSICIAN: BC – Clearwater. Family physicians with ER skills wanted to join the medical team in this beautiful community. Rural setting, relaxed pace of work, newer hospital, excellent compensation and an amazing provincial park as your backyard; this is what Clearwater has to offer you. Known for world-class recreation, enriched culture, and vibrant community life, Clearwater offers the balanced lifestyle you have been looking for. Enjoy working in a single group practice, the modern acute care facility, and 21-bed residential care facility. For more information contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-281

FAMILY PHYSICIAN: BC – Lillooet. Every fifth week you get a one week vacation! Further vacation negotiable! Excellent incentives and remuneration are only part of this opportunity. Wanted: family practitioner with ER skills to enjoy rural living and a magnificent wilderness playground. Lillooet is a rural town set against the beautiful backdrop of the Fraser River and spectacular B.C. Coastal Mountains. Located only 1.5 hours

from Whistler, there are endless opportunities to enjoy fishing, canoeing, hiking, mountain biking, snowmobiling, ice-climbing, and skiing. Work with five other physicians in a single, unopposed practice. On call: 1-in-5. Fee-for-service. Numerous recruitment and retention incentives. For more information contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-282

PATHOLOGIST: BC – Trail. Nestled in the Selkirk Mountains and embraced by rolling hills and the shores of the Columbia River, Kootenay Boundary Regional Hospital (KBRH) seeks a permanent general pathologist with experience in clinical pathology. Main responsibilities of this role will be in anatomic pathology, hematopathology, chemistry and transfusion medicine. The oversight for microbiology is provided by microbiologists in Kelowna and Kamloops. Laboratory services are fully integrated with full professional support from the other pathologists in the health authority through various means including telepathology. There is no scheduled obligated on call; it is based on availability only. Eligible for additional remuneration including: 11.34% retention premium; \$9,914.40 annual retention flat fee; significant recruitment visit and relocation reimbursements. For more information contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-283

FAMILY PHYSICIAN: BC – Enderby. Interior Health is seeking a full-time physician to join a well-established clinic located in the beautiful North Okanagan. Collaborative practice in multidisciplinary setting that includes laboratory, mental health, public health and community care. Contract includes guaranteed income and no overhead; and Enderby qualifies for benefits under the Rural Incentive Program. Year-round recreation includes access to lakes in the summer and skiing in the winter. For more information contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-284

FAMILY PHYSICIAN: BC – Princeton. The city of Princeton is seeking a permanent family physician for their vibrant active community. The successful candidate will work with a team of physicians who provide a full range of medical services in a six-bed community hospital. Scope of practice includes joining on-call for 24/7 Emergency Department. Princeton General Hospital provides emergency, general medicine and basic laboratory and diagnostic imaging services. Hours are 9 am - 5 pm plus on call, 1:4. With its friendly people, and scenic location amongst the rivers, mountains, and lakes, the area offers a wide range of year-round outdoor recreational opportunities. Additional relocation, recruitment and incentives are available. Please contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-269

FAMILY PHYSICIAN: BC – Elkford is located in the beautiful Elk Valley in the Rocky Mountains, close to Calgary. Recreational opportunities are limitless, including world-class mountain biking, fly fishing, and skiing at nearby Fernie Alpine Resort. Elkford seeks a full-time physician to fill a salaried, contract position in an EMR clinic with an integrated multidisciplinary team, laboratory and diagnostic imaging services, and ER (daytime only). Good regional specialist support. Generous signing bonus, relocation funding, rural retention bonuses, 43 paid vacation days per year, accommodation (6 months), and local recreation passes provided. For more information contact: email physicianrecruitment@interiorhealth.ca or view us online at our Web site www.betterhere.ca –RM-265b

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The numbers of subjects with elevated temperature ($\geq 38.3^{\circ}\text{C}$ [$\geq 101.0^{\circ}\text{F}$]) within 7 days postvaccination were similar in the ZOSTAVAX[®] and the placebo vaccination groups [6 (0.2%) vs. 8 (0.3%), respectively].

Other Studies

In other clinical trials conducted prior to the completion of the SPS, the reported rates of noninjection-site zoster-like and varicella-like rashes within 42 days postvaccination were also low in both zoster vaccine recipients and placebo recipients. Of the 17 reported noninjection-site zoster-like and varicella-like rashes, 10 specimens were available and adequate for PCR testing. The Oka/Merck strain was identified by PCR analysis from the lesion specimens of only two subjects who reported varicella-like rashes (onset on Day 8 and 17).

To address concerns for individuals with an unknown history of vaccination with ZOSTAVAX[®], the safety and tolerability of a second dose of ZOSTAVAX[®] was evaluated. In a placebo-controlled, double-blind study, 98 adults 60 years of age or older received a second dose of ZOSTAVAX[®] 42 days following the initial dose; the vaccine was generally well tolerated. The frequency of vaccine-related adverse experiences after the second dose of ZOSTAVAX[®] was generally similar to that seen with the first dose.

Post-Marketing Adverse Drug Reactions

The following additional adverse reactions have been identified during post-marketing use of ZOSTAVAX[®]. Because these reactions are reported voluntarily from a population of uncertain size, it is generally not possible to reliably estimate their frequency or establish a causal relationship to the vaccine.

Gastrointestinal disorders: nausea

Skin and subcutaneous tissue disorders: rash.

Musculoskeletal and connective tissue disorders: arthralgia; myalgia.

General disorders and administration site conditions: injection-site rash; injection-site urticaria; pyrexia; injection-site lymphadenopathy.

Immune system disorders: hypersensitivity reactions including anaphylactic reactions.

If a patient experiences an adverse event following immunization, please complete the appropriate Adverse Events following Immunization (AEFI) Form and send it to your local Health Unit in your province/territory.

To report a suspected adverse reaction, please contact Merck Canada Inc. in any of the following ways:

– Call toll-free 1-800-567-2594

– Complete a Canada Vigilance Reporting Form and fax toll-free to 1-800-369-3090

– Mail to: Merck Canada Inc., Pharmacovigilance, P.O. Box 1005, Pointe-Claire – Dorval, QC H9R 4P8

DRUG INTERACTIONS

Overview

ZOSTAVAX[®] must not be mixed with any other medicinal product in the same syringe. Other medicinal products must be given as separate injections and at different body sites.

Concurrent administration of ZOSTAVAX[®] and antiviral medications known to be effective against VZV has not been evaluated.

Use with Other Vaccines

ZOSTAVAX[®] and PNEUMOVAX[®] 23 (pneumococcal vaccine, polyvalent, MSD Std.) should not be given concomitantly because concomitant use resulted in reduced immunogenicity of ZOSTAVAX[®] (see CLINICAL TRIALS in the product monograph).



Administration

DOSAGE AND ADMINISTRATION

(see Product Monograph for complete information)
Recommended Dose and Dosage Adjustment

FOR SUBCUTANEOUS ADMINISTRATION.

Do not inject intravascularly.

Individuals should receive a single dose consisting of the entire content of the vial (approximately 0.65 mL).

ZOSTAVAX[®] is not a treatment for zoster or postherpetic neuralgia (PHN). If an individual develops herpes zoster despite vaccination, active current standard of care treatment for herpes zoster should be considered.

At present, the duration of protection after vaccination with ZOSTAVAX[®] is unknown. In the Shingles Prevention Study (SPS), protection was demonstrated through 4 years of follow-up. The need for revaccination has not yet been defined.

Reconstitute immediately upon removal from the freezer.

To reconstitute the vaccine, use only the diluent supplied, since it is free of preservatives or other antiviral substances which might inactivate the vaccine virus.

Vial of diluent:

To reconstitute the vaccine, first withdraw the entire contents of the diluent vial into a syringe.

To avoid excessive foaming, slowly inject all of the diluent in the syringe into the vial of lyophilized vaccine and gently agitate to mix thoroughly. Withdraw the entire contents into a syringe, and using a new needle, inject the total volume of reconstituted vaccine subcutaneously, preferably into the upper arm - deltoid region.

IT IS RECOMMENDED THAT THE VACCINE BE ADMINISTERED IMMEDIATELY AFTER RECONSTITUTION, TO MINIMIZE LOSS OF POTENCY. DISCARD RECONSTITUTED VACCINE IF IT IS NOT USED WITHIN 30 MINUTES.

Do not freeze reconstituted vaccine.

CAUTION: A sterile syringe free of preservatives, antiseptics, and detergents should be used for each injection and/or reconstitution of ZOSTAVAX[®] because these substances may inactivate the vaccine virus.

It is important to use a separate sterile needle and syringe for each patient to prevent transfer of infectious agents from one individual to another.

Needles should be disposed of properly.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit. ZOSTAVAX[®] when reconstituted is a semi-hazy to translucent, off white to pale yellow liquid.

OVERDOSAGE

There are no data with regard to overdose.

For management of a suspected drug overdose, contact your regional Poison Control Center.

STORAGE AND STABILITY

Storage

ZOSTAVAX[®] **SHOULD BE STORED FROZEN** at an average temperature of -15°C or colder until it is reconstituted for **injection** (see DOSAGE AND ADMINISTRATION). Any freezer, including frost-free, that has a separate sealed freezer door and reliably maintains an average temperature of -15°C or colder is acceptable for storing ZOSTAVAX[®]. The diluent should be stored separately at room temperature (20 to 25°C) or in the refrigerator (2 to 8°C). Do not store the diluent in a freezer.

Before reconstitution, protect from light.

DISCARD IF RECONSTITUTED VACCINE IS NOT USED WITHIN 30 MINUTES.

DO NOT FREEZE THE RECONSTITUTED VACCINE.

Supplemental Product Information

WARNINGS AND PRECAUTIONS

Special Populations

Geriatric: The mean age of subjects enrolled in the largest ($N=38,546$) clinical study of ZOSTAVAX[®] was 69 years (range 59-99 years). Of the 19,270 subjects who received ZOSTAVAX[®], 10,378 were 60-69 years of age, 7,629 were 70-79 years of age, and 1,263 were 80 years of age or older. ZOSTAVAX[®] was demonstrated to be generally safe and effective in this population.

Pregnant Women: There are no studies in pregnant women. It is also not known whether ZOSTAVAX[®] can cause foetal harm when administered to a pregnant woman or can affect reproduction capacity. However naturally-occurring varicella-zoster virus infection is known to sometimes cause foetal harm. Therefore, ZOSTAVAX[®] should not be administered to pregnant women; furthermore, pregnancy should be avoided for three months following vaccination (see CONTRAINDICATIONS).

Nursing Women: It is not known whether VZV is secreted in human milk. Therefore, because some viruses are secreted in human milk, caution should be exercised if ZOSTAVAX[®] is administered to a nursing woman.

Pediatrics: ZOSTAVAX[®] is not recommended for use in this age group.

HIV-AIDS Patients: The safety and efficacy of ZOSTAVAX[®] have not been established in adults who are known to be infected with HIV with or without evidence of immunosuppression (see CONTRAINDICATIONS).

Immunocompromised Subjects: Data are not available regarding the use of ZOSTAVAX[®] in immunocompromised subjects (see CONTRAINDICATIONS).

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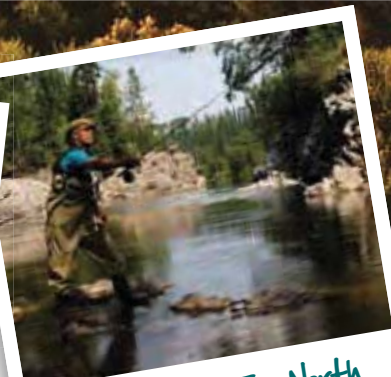
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IT IS ESTIMATED THAT
NEARLY

1 IN 3

CANADIANS WILL EXPERIENCE
HERPES ZOSTER IN THEIR LIFETIME,
AND THE RISK INCREASES AFTER
THE AGE OF 50.¹

FOR SOME, IT CAN MEAN EXCRUCIATING
AND POTENTIALLY DEBILITATING PAIN.^{1,2,*}

SELECTED IMPORTANT SAFETY INFORMATION

ZOSTAVAX® is not a treatment for zoster or postherpetic neuralgia (PHN). If an individual develops herpes zoster despite vaccination, active current standard of care treatment for herpes zoster should be considered. Vaccination with ZOSTAVAX® may not result in protection of all vaccine recipients. ZOSTAVAX® is contraindicated in patients with a history of hypersensitivity to any component of the vaccine, including gelatin; a history of anaphylactic/anaphylactoid reaction to neomycin; primary and acquired immunodeficiency states due to conditions such as: acute and chronic leukemias; lymphoma; other conditions affecting the bone marrow or lymphatic system; immunosuppression due to HIV/AIDS, cellular immune deficiencies; immunosuppressive therapy (including high-dose corticosteroids); active untreated tuberculosis; pregnancy. In clinical trials, ZOSTAVAX® has been evaluated for general safety in more than 32,000 adults 50 years of age or older. ZOSTAVAX® was generally well tolerated. Vaccine-related injection-site and systemic adverse experiences reported at an incidence ≥1% are shown below. The overall incidence of vaccine-related injection-site adverse experiences was significantly greater for subjects vaccinated with ZOSTAVAX® versus subjects who received placebo (48% for ZOSTAVAX® and 17% for placebo among recipients aged ≥60 (Shingles Prevention Study [SPS]) and 63.9% for ZOSTAVAX® and 14.4% for placebo among recipients aged 50-59) (ZOSTAVAX® Efficacy and Safety Trial [ZEST]). Vaccine-related injection-site and systemic adverse experiences reported in ≥1% of adults who received ZOSTAVAX® (N=3,345) or placebo (N=3,271) (0-42 Days Postvaccination) in the Adverse Event Monitoring Substudy of the SPS were: erythema[†] (35.6%, 6.9%), pain/tenderness[†] (34.3%, 8.6%), swelling[†] (26.1%, 4.5%), hematoma (1.6%, 1.4%), pruritus (7.1%, 1.0%), warmth (1.7%, 0.3%), headache (1.4%, 0.9%). Most of these adverse experiences were reported as mild in intensity. The remainder of subjects in the SPS received routine safety monitoring, but were not provided report cards. The types of events reported in these patients were generally similar to the SPS subgroup of patients in the Adverse Event Monitoring Substudy. Vaccine-related injection-site and systemic adverse experiences reported in ≥1% of adults who received ZOSTAVAX® (N=11,094) or placebo (N=11,116) (1-42 Days Postvaccination) in the ZEST were: pain[†] (53.9%, 9.0%), erythema[†] (48.1%, 4.3%), swelling[†] (40.4%, 2.8%), pruritus (11.3%, 0.7%), warmth (3.7%, 0.2%), hematoma (1.6%, 1.6%), induration (1.1%, 0.0%), headache (9.4%, 8.2%), pain in extremity (1.3%, 0.8%).

* ZOSTAVAX® is not indicated to reduce the morbidity and complications associated with herpes zoster.

[†] Designates a solicited adverse experience. Injection-site adverse experiences were solicited only from Days 0-4 postvaccination in SPS and from Days 1-5 postvaccination in ZEST.

References: 1. Data on file, Merck Canada Inc. Product Monograph. ZOSTAVAX®, 2011. 2. Clinical Manifestations: Chickenpox. In: Mandell G, Bennett J, Dolin R eds. Principles and Practice of Infectious Diseases, 6th ed, vol 2. Philadelphia: Elsevier; 2005.

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