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Le journal officiel de la Société de la médecine rurale du Canada

VOLUME 21, NO. 2, SPRING 2016

VOLUME 21, N° 2, PRINTEMPS 2016



Lolo™

A low-dose combined oral contraceptive with 10 mcg of ethinyl estradiol^{1*}

*Any benefits from the lower estrogen exposure provided by Lolo™ have not been evaluated.

Lolo™ offers the lowest ethinyl estradiol dose of any combined oral contraceptive in Canada^{2*}



Indication and clinical use:

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Contraindications:

Women with:

- History of (or actual) thrombophlebitis or thromboembolic disorders
- History of (or actual) cerebrovascular disorders
- History of (or actual) myocardial infarction or coronary artery disease
- Valvular heart disease with complications
- History of (or actual) prodromi of a thrombosis
- Active liver disease, or history of (or actual) benign or malignant liver tumours
- Known or suspected carcinoma of the breast
- Carcinoma of the endometrium or other known or suspected estrogen-dependent neoplasia
- Undiagnosed abnormal vaginal bleeding
- Steroid-dependent jaundice, cholestatic jaundice, history of jaundice of pregnancy
- Any ocular lesion arising from ophthalmic vascular disease
- Known or suspected pregnancy
- Current (or history of) migraine with focal aura
- History of (or actual) pancreatitis if associated with severe hypertriglyceridaemia
- Presence of severe/multiple risk factor(s) for arterial or venous thrombosis

Most serious warnings and precautions:

Smoking: Cigarette smoking increases the risk of serious cardiovascular events associated with the use of hormonal contraceptives. This risk increases with age, particularly in women over 35 years of age, and with the number of cigarettes smoked. For this reason, Lolo™ should not be used by women over the age of 35 who smoke.

Sexually Transmitted Infections (STIs): Patients should be counselled that birth control pills DO NOT PROTECT against sexually transmitted infections (STIs) including HIV/AIDS. For protection against STIs, it is advisable to use latex or polyurethane condoms IN COMBINATION WITH birth control pills.

General: Patients should discontinue medication at the earliest manifestation of thromboembolic and cardiovascular disorders, conditions which predispose to venous stasis and vascular thrombosis, visual defects (partial or complete), papilledema or ophthalmic vascular lesions, severe headache of unknown etiology or worsening of pre-existing migraine headache, or increase in epileptic seizures.

Other relevant warnings and precautions:

- Potential increased risk of breast cancer, cervical cancer, hepatocellular carcinoma
- Predisposing factors for coronary artery disease
- Hypertension
- Diabetes
- Adverse lipid changes
- Crohn's disease, ulcerative colitis
- Vaginal bleeding
- Fibroids
- Increased risk of arterial and venous thrombotic and thromboembolic diseases
- Jaundice, gallbladder disease, hepatic nodules

- Angioedema, fluid retention
- Risk of thromboembolic complications after major surgery
- History of emotional disturbances
- Amenorrhea
- Reduced efficacy (due to missed dose, gastrointestinal disturbances or concomitant medication)
- Chloasma
- Pregnant or nursing women
- Physical examination and follow-up

For more information:

Consult the Product Monograph at www.lolocanada.ca/lolo/pm for important information regarding adverse reactions, drug interactions and dosing information (particularly in regards to dose intervals not exceeding 24 hours) not discussed in this piece. The Product Monograph is also available by calling Actavis Specialty Pharmaceuticals Co. at 1-855-892-8766.

References: 1. Lolo™ Product Monograph. Warner Chilcott Canada Co. December 10, 2013. 2. 2012 Hormonal Contraception Available in Canada. The Society of Obstetricians and Gynaecologists of Canada. http://sogc.org/news_items/hormonal-contraception-comparative-chart-now-available-2/. Accessed May 13, 2014.



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VOL. 21, No. 2, SPRING / PRINTEMPS 2016

EDITORIALS / ÉDITORIAUX

- 35 Twenty years young — *Peter Hutten-Czapski, MD*
- 36 Vingt ans déjà, à peine vingt ans — *Peter Hutten-Czapski, MD*
- 37 President's message. Vision, mission, action — *John Soles, MD*
- 38 Message du président. Vision, mission, action — *John Soles, MD*

ORIGINAL ARTICLES / ARTICLES ORIGINAUX

- 39 Rural cardiac rehabilitation: a 20-year success story — *Edwin K. Gillin, PhD; Alan Salmoni, PhD; Grant M. Dawson, MB BCh; Michael J. Dawson, MD; Majed Fiaani, MB BCh*
- 46 Should I apply to medical school? High school students and barriers to application — *Desmond Whalen, BSc (Hons); Chelsea Harris, MPH; Chris Harty, BN; Alison Greene, BSc; Elizabeth Faour, BSc (Hons); Kalen Thomson, BMed (Hons); Mohamed Ravalia, MD*

THE PRACTITIONER / LE PRATICIEN

- 51 The occasional digital nerve block — *Len Kelly, MD*
- 53; 54 Country cardiograms case 56 — *Charles Helm, MD*

OFF CALL / DÉTENTE

- 56 Seeds of hope — *Basia Siedlecki, MD*

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58

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SRPC AND THE ROUNDS

The Society of Rural Physicians of Canada is excited to announce its official partnership with The Rounds.

The Rounds has been built specifically for physicians in Canada. The platform is free for any practising physician, and the SRPC group (for SRPC members only) has been designed specifically for rural collaboration. The platform will allow us to have more engaging conversations, and for those subscribed to the listserv (RuralMed), it will offer a new and exciting place to engage with familiar peers. Signing into The Rounds will immediately connect you with thousands of physicians and surgeons.

The Rounds platform offers a wide range of member benefits. We encourage you to sign up and join the official SRPC group here: www.therounds.ca.

SAVE THE DATE

RURAL AND REMOTE 2016

MAY 5-7, 2016

CHARLEVOIX, QUE., AT THE MANOIR RICHELIEU

Twenty years young

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Twenty years ago, there was no scholarly discipline of rural generalist medicine, and there was no dedicated place to publish such literature in Canada. In response to such need, *CJRM* was started 20 years ago. Since then, we have created a go-to space for rurally relevant scholarship. *CJRM* is open to all at no cost online, and, by our quality, we have earned our right to be indexed in Index Medicus.

The audacious idea of starting our own journal came to John Wootton in 1994. It fell to him to become our inaugural scientific editor, and he convinced Suzanne Kingsmill to become the associate editor. The editorial board consisted of other notables, including Gordon Brock, Stuart Iglesias, Robert Martel, James Rourke, Jim Thompson and Carl Whiteside.

We continue to publish our “Occasional” practitioner series, which addresses the issues of rural generalist physicians who have little experience with the rare conditions they face, but are both capable and obliged to stretch a bit to meet patients’ needs. I recollect the seminal article by Keith MacLellan, “The Occasional Burr Hole,”¹ by which someone with an epidural bleed might be saved if you have but the courage.

The themes in *CJRM* of courage and meeting the needs of the rural population are also highlighted in the concern for women’s health. Women in rural areas get pregnant too, regardless of where specialists want to practise. *CJRM* has

published definitive literature reviews and policy papers on rural maternity care, including on training rural generalists to perform cesarean deliveries.²

I feel particularly proud of the issue we dedicated to Aboriginal concerns (Fall 2014). In this issue, we collected diverse, original material on pneumonia, the evolving nature of narcotic use in northwestern Ontario and the Aboriginal curriculum of the Northern Ontario School of Medicine.

CJRM has published multiple articles on the lived experience of rural physicians. This body of work is a virtual treasure trove of information that may have been too eclectic to be published elsewhere.

There have been obstacles along the way. Most recently, *CJRM* is facing the twin challenges encountered by the entire publishing industry: dwindling advertising revenue and a readership that has moved online. We have been offering the option of electronic subscription since 2010, and we will soon be moving to an electronic distribution, with only 1 print version annually.

Whatever the future brings, we plan to continue the work of building the knowledge base for rural medicine.

REFERENCES

1. MacLellan K. The occasional burr hole. *Can J Rural Med* 1998;3:223-5.
2. Iglesias S, Hutten-Czapski P. Joint position paper on training for rural family practitioners in advanced maternity skills and cesarean section. *Can J Rural Med* 1999;4:209-16.

Vingt ans déjà, à peine vingt ans

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Il y a vingt ans déjà — à peine vingt ans —, la médecine rurale généraliste n'existait pas comme discipline universitaire et on ne trouvait aucun endroit réservé à la publication d'articles sur ce sujet au Canada. Le besoin était pourtant là et, pour y répondre, le *JCRM* a alors été lancé et il est devenu depuis le lieu de publication de choix pour les écrits scientifiques en médecine rurale. Le *JCRM* est accessible à tous en ligne, gratuitement, et sa qualité lui a mérité le droit de figurer dans l'*Index Medicus*.

C'est John Wootton, en 1994, qui a eu l'idée audacieuse de créer notre propre journal. Il en est dès lors devenu le premier rédacteur en chef scientifique et il a persuadé Suzanne Kingsmill de devenir rédactrice en chef adjointe. Le conseil de rédaction réunissait d'autres collègues de renom, notamment Gordon Brock, Stuart Iglesias, Robert Martel, James Rourke, Jim Thompson et Carl Whiteside.

Nous publions toujours notre série sur la pratique « occasionnelle », où il est question de problèmes de santé rares que les médecins généralistes ruraux ont parfois à traiter, sans avoir beaucoup d'expérience en la matière, et qui les obligent à pousser plus loin leurs connaissances et leurs capacités afin d'être en mesure de répondre aux besoins des patients. Je me rappelle l'article phare de Keith MacLellan, « The Occasional Burr Hole¹ », au sujet du courage dont il faut faire preuve pour traiter un patient souffrant d'un saignement péri-dural — et lui sauver ainsi la vie.

Les thèmes du courage et des besoins des patients en milieu rural reviennent souvent dans le *JCRM*, notamment lorsqu'il est question de la santé des femmes. Les femmes des régions rurales vivent elles aussi des grossesses, qu'importe le lieu où les spécialistes choisissent d'installer leurs cabinets. Le

JCRM a publié des analyses documentaires et des documents d'orientation déterminants sur les soins de maternité en milieu rural, y compris sur la formation des généralistes ruraux à pratiquer des césariennes².

Je suis particulièrement fier du numéro que nous avons consacré à la santé des populations autochtones (automne 2014). Nous y avons réuni tout un éventail d'articles originaux qui ont abordé diverses questions, dont la pneumonie, l'évolution de la consommation abusive de narcotiques dans le nord-ouest de l'Ontario et le programme de formation en santé des populations autochtones de l'École de médecine du nord de l'Ontario.

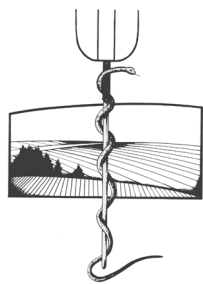
Le *JCRM* a publié des dizaines d'articles sur l'expérience que vivent les médecins ruraux. Ce corpus de connaissances est un véritable trésor virtuel et il rassemble de l'information spécialisée qu'il aurait probablement été impossible de publier ailleurs.

Bien des obstacles se sont dressés en chemin. Depuis peu, le *JCRM* fait face au double défi qui confronte toute l'industrie de la publication : des revenus publicitaires décroissants et un lectorat qui se déplace en ligne. Nous offrons un choix d'abonnement en ligne depuis 2010 et nous passerons bientôt à une distribution électronique, sauf pour un numéro imprimé par année.

Quoi que nous réserve l'avenir, nous comptons poursuivre le travail d'édification du corpus des connaissances en médecine rurale.

RÉFÉRENCES

1. MacLellan K. « The occasional burr hole ». *Can J Rural Med* 1998;3:223-5.
2. Iglesias S, Hutten-Czapowski P. « Joint position paper on training for rural family practitioners in advanced maternity skills and cesarean section ». *Can J Rural Med* 1999;4:209-16.



President's message. Vision, mission, action

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In December, lead volunteers and staff of the SRPC held a planning workshop to develop a strategic plan for the society. The volunteers included our current council, resident and student members and 6 past presidents of the SRPC. Others had a chance to share their thoughts before the meeting. Our proposed vision statement is “Excellent health care, close to home, for all rural Canadians.” Our proposed mission statement is “Championing rural generalist medical care through education, collaboration, advocacy, and research.”

A series of meetings in Banff in January showed our mission statement in action. The SRPC's plastics course demonstrated our approach to education: rural doctors instructing other rural doctors in procedures that will allow them to provide treatment to patients in their home community. The Enhanced Surgical Skills program that followed offered training to our highly skilled rural colleagues who allow women to safely deliver their newborns close to home, give patients the option to have some surgeries in their own communities and help support our emergency departments with their knowledge and skills. Also at this meeting were our urban surgical colleagues who are essential in the support of surgical programs, trauma care and surgical education in rural communities.

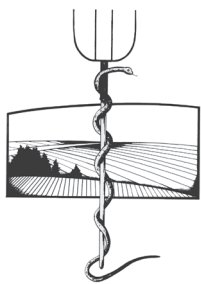
Finally, the Summit on Rural Surgery and Operative Delivery brought the

SRPC, The Society of Obstetricians and Gynaecologists of Canada, The College of Family Physicians of Canada, the Royal College of Physicians and Surgeons of Canada and The Canadian Association of General Surgeons together to consider the next steps after the release of the Joint Position Paper on Rural Surgery and Operative Delivery.¹ How do we develop networks of obstetric and surgical care involving rural communities and their referral centres to optimize delivery of care? How do we organize institutional support at the national level for sustainable surgical and maternity services in rural areas? How do we build flexible educational pathways such that existing operative delivery programs in rural communities can be supported and nested within the networks? How do we deal with accreditation and credentialing issues?

We have made a good start, and the work will continue. Collaboration, advocacy for rural populations, research that supports the provision of services close to home and an emphasis on continuing education have gotten us to this point. I am optimistic that the results of this collaboration will contribute to excellent health care, close to home, for all rural Canadians.

REFERENCE

1. Iglesias S, Kornelsen J, Woollard R, et al. Joint position paper on rural surgery and operative delivery. *Can J Rural Med* 2015;20:129-38.



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Message du président. Vision, mission, action

En décembre, des bénévoles principaux et des membres du personnel de la SMRC ont tenu une séance de planification afin d'élaborer le plan stratégique de la société. Les bénévoles regroupaient les membres du conseil actuel, des médecins résidents et des étudiants, ainsi que 6 anciens présidents de la SMRC. D'autres intéressés ont eu l'occasion de s'exprimer avant la réunion. L'énoncé de vision que nous proposons est « D'excellents soins de santé à proximité pour toutes les populations rurales », et l'énoncé de mission que nous proposons est « Défendre les soins médicaux généralistes ruraux par l'éducation, la collaboration, la représentation et la recherche. »

Notre énoncé de mission s'est manifesté lors d'une série de réunions tenues à Banff en janvier. Le cours de chirurgie plastique de la SMRC témoigne de notre façon d'aborder l'éducation : des médecins qui exercent en régions rurales enseignent à d'autres médecins qui exercent dans des milieux semblables des interventions qui leur permettront de traiter leurs patients. Le programme de techniques chirurgicales avancées qui a suivi a offert une formation à nos collègues très qualifiés qui, en milieu rural, permettent aux femmes d'accoucher en toute sécurité près de chez elles, donnent aux patients la possibilité de subir certaines interventions chirurgicales dans leur communauté et appuient nos services d'urgence par leurs connaissances générales et leurs compétences spécialisées. Cette réunion a aussi attiré des collègues chirurgiens venus de régions urbaines, qui jouent un rôle essentiel en appuyant les programmes de chirurgie, les soins aux traumatisés et la formation en chirurgie dans les communautés rurales.

Enfin, le Sommet sur la chirurgie et

l'accouchement par intervention en milieu rural a réuni la SMRC, la Société des obstétriciens et gynécologues du Canada, le Collège des médecins de famille du Canada, le Collège royal des médecins et chirurgiens du Canada et l'Association canadienne des chirurgiens généraux. Leurs représentants se sont penchés sur les étapes à suivre après la publication de l'énoncé de position commun sur la chirurgie et l'accouchement par intervention en milieu rural¹. Comment créer des réseaux de soins obstétriques et chirurgicaux entre les communautés rurales et leurs centres d'aiguillage afin d'optimiser la prestation des soins? Comment mettre sur pied un mécanisme national de soutien institutionnel pour assurer le maintien durable des services de maternité et de chirurgie en régions rurales? Comment créer des voies de formation flexibles qui permettent d'appuyer les programmes existants d'accouchement par intervention en milieu rural et de les intégrer dans les réseaux? Comment composer avec les problèmes d'agrément et de reconnaissance des titres?

Nous avons pris un bon départ et poursuivons notre travail. La collaboration, la représentation des populations rurales, la recherche qui appuie la prestation de services à proximité du domicile et l'importance accordée au perfectionnement continu nous ont amenés jusqu'ici. J'ai bon espoir que les résultats de ces collaborations contribueront à l'excellence des soins de santé fournis à proximité à toutes les populations rurales du Canada.

RÉFÉRENCE

1. Iglesias S, Kornelsen J, Woollard R, et coll. « Déclaration de principe commune sur la chirurgie et l'accouchement par intervention en milieu rural ». *J Can Med Rurale* 2015;20:129-38.

Rural cardiac rehabilitation: a 20-year success story

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*This article has been peer
reviewed.*

Introduction: Data are lacking on long-term participation in a clinically supervised cardiac rehabilitation program in a rural setting. We sought to determine whether there were sustained improvements in physiologic measures and discover what restorative and deteriorative processes took place over time.

Methods: We retrospectively analyzed the records of patients who were enrolled for a least 1 year in the Healthy Hearts Cardiac Rehabilitation Program. Data from stress tests were tracked for up to 18 years to determine whether there were any sustained improvements and what factors were associated with restorative and deteriorative processes.

Results: We analyzed data from 85 participants. The mean age of the participants was 72 years, and the mean length of participation was 8 years. Duration of stress testing significantly ($p < 0.01$) increased by a mean of 15% from the first year to the second year, with a corresponding increase in estimated metabolic equivalent of task (MET) level (Cohen $d = 0.82$). The increase in duration was sustained into the ninth year, with an overall increase of 35% compared with the first year of testing. After the ninth year, the duration and estimated MET levels declined.

Conclusion: Participants in the cardiac rehabilitation program demonstrated improved duration of stress testing, and stable rate-pressure product, blood pressure and resting heart rate during long-term participation in the program.

Introduction : On manque d'information sur la participation à long terme aux programmes de réadaptation cardiaque avec supervision clinique en milieu rural. Nous avons donc cherché à déterminer si ces programmes entraînent une amélioration physiologique permanente et à décrire les processus de guérison et d'aggravation qui surviennent au fil du temps.

Méthodes : Nous avons procédé à une analyse rétrospective des dossiers de patients qui ont participé au programme Healthy Hearts pendant au moins 1 an. Des données sur leurs résultats aux épreuves d'effort sur une période maximale de 18 ans ont été recueillies pour déterminer la présence d'améliorations durables et mettre en évidence les facteurs associés à la guérison et à l'aggravation.

Résultats : Nous avons étudié les dossiers de 85 patients; la durée de participation moyenne était de 8 ans, et l'âge moyen des participants, de 72 ans. La durée de l'épreuve d'effort a connu une augmentation significative de 15 % en moyenne ($p < 0,01$) de la première à la deuxième année, associée à une hausse correspondante de l'équivalent métabolique (MET) estimé (d de Cohen = 0,82). Cette augmentation s'est poursuivie jusqu'à la neuvième année, où la durée était supérieure de 35 % à celle de la première année. Par la suite, la durée de l'épreuve et le MET estimé ont commencé à diminuer.

Conclusion : Au cours de leur participation prolongée au programme, les patients ont réussi à augmenter la durée de leur épreuve d'effort, et le produit de leur tension systolique par la fréquence des contractions cardiaques, leur pression artérielle et leur fréquence cardiaque au repos sont demeurés stables.

INTRODUCTION

Over the past 5 decades, participation in cardiac rehabilitation programs has been shown to reduce mortality by up to 35%, improve lipid profiles, reduce hospital readmission rates and improve patients' quality of life.¹⁻⁵ Cardiac rehabilitation programs provide education and counselling services to help patients with heart conditions increase physical fitness, reduce symptoms, improve health and reduce the future risk of heart problems.

Research suggests that participation in higher levels of physical activity in leisure time has an inverse relation to mortality in patients after myocardial infarction.⁶ In spite of these positive findings, participation rates in cardiac rehabilitation programs are low, with only 25%–31% of eligible men and 11%–20% of eligible women participating.^{7,8}

Delivery of a medically supervised program in a rural setting is particularly challenging. Difficulties include lack of qualified medical personnel, adequate workout facilities and funding.^{3,9-11} In a rural setting, travel distance and regular attendance of qualified personnel can be barriers to participation.¹² Potential participants face a variety of obstacles that reduce their likelihood of entering a program. Disability, age, travel distance, initial disease severity, diagnosis, sex and level of education are well-documented barriers.¹³⁻¹⁵

Even when an individual decides to join a cardiac rehabilitation program, there is documented difficulty in program adherence.^{2,16-18} In a randomized clinical trial, researchers found that adherence to recommended levels of physical activity progressively worsened once participants had completed the second phase of a cardiac rehabilitation program.¹⁹

Although robust improvements in aerobic capacity in the 6 months following intervention with a cardiac rehabilitation program are well documented, there is limited evidence that these improvements are maintained for longer periods.⁴ There is a lack of research involving participants in a cardiac rehabilitation program who maintained regular attendance and exercise over a prolonged period. In a 12-year follow-up study, Gerber and colleagues⁶ found that patients who engaged in a 12-week cardiac rehabilitation program and then participated in nonstructured or leisure physical activity had a death rate about half of that of sedentary patients after myocardial infarction. However, data are lacking on the long-term effect of structured exercise in a cardiac rehabilitation program with documented stress tests,

presenting conditions and laboratory data over the course of a program.

We present the findings of a retrospective study involving participants in a rural cardiac rehabilitation program over a period of 18 years. We sought to determine whether there were sustained improvements in physiologic measures and to discover what restorative and deteriorative processes took place over time.

METHODS

Participants

We retrospectively analyzed the records of participants whose names had been redacted from secondary data acquired from intake interviews, stress test results and laboratory findings from 1994 to 2004. Patient data were obtained for men and women who had attended the Healthy Hearts Cardiac Rehabilitation Program in a small rural community in Ontario and who were given the option of continuing the program indefinitely. The class has been held in the same recreation facility for 15 of the 20 years of the program. Participants were encouraged to attend for as long as they wished.

Program data

On entry into the program, a baseline stress test was obtained. Thereafter, stress tests were administered twice yearly, on average, by the same physician over most of the study period, until the participant's cardiac status was considered stable. The program operated in accordance with general guidelines produced by the American Association of Cardiovascular and Pulmonary Rehabilitation.²⁰

Participants with a minimum of 1 year of program participation were entered into the study data set. Each file was coded per stress test, and the results were averaged to represent each year of program participation.

Each participant file was initially separated into 5 general categories that included coded general participant information (9 items), presenting condition information (17 items), stress test variables (19 items), laboratory results (12 items) and medication (13 categories, 109 items).

The first pilot study used the data from 20 participants. This was analyzed to determine if there were key categories or items that could assist in understanding processes that were improving (restorative) or stabilizing or deteriorating (deteriorative).

General program information

Because the medical director and program staff remained relatively constant, the exercise method was consistently applied over the study period. Currently, the Healthy Hearts program has about 150 participants and 18 exercise classes per week. Each participant attended a clinically supervised 1-hour exercise class twice per week. Physician-supervised classes are offered, which ensures close monitoring and quick access to medical intervention for higher-risk participants. Once the participants have achieved cardiac stability and reach an estimated metabolic equivalent of task (MET) level that enabled them to exercise independently, they were transferred to the group that was clinically supervised by a nonphysician. Estimated MET levels used in this study were based on level and duration achieved during the stress test and did not use exhaled gas analysis.

Stress test variable analyses

There were certain stress test results that were performed only as equipment became available. Complete data sets were available for the following variables: weight; pretest and peak heart rate, systolic and diastolic blood pressure values, and rate-pressure product; maximum estimated MET levels; stage; and time. Partial data sets were available for ST/HR (ST segment depression/heart rate) Index, and pretest and maximum oxygen saturation.

Statistical analyses

We completed consolidation of the results into the 5 categories and statistical analysis using *t* testing with Wilcoxon heteroscedasticity correction and matrix modelling. This was done to determine which categories and items would be most useful in identifying factors associated with participant health. We used SPSS, version 20, statistical analysis software. As a result of the pilot study, the laboratory and medication categories were eliminated owing to the variability of test frequency, complexity of dosage and inability to confirm adherence to medication.

The next phase of research involved input of participants' data, excluding the first 20 participants. Each of these participants' data were entered into identical categories: coded general participant information, presenting condition information and stress test variables. The 3 categories were then consolidated for all participants and statistically analyzed using SPSS to identify any areas of significance and health

outcome measures observed. Because participants entered the program at different times, some non-normally distributed variables were compared using the Wilcoxon signed-rank test. The use of analysis of variance and repeated-measures was not possible due to the heteroscedastic nature of the data. We used a *p* value of 0.01 instead of 0.05 to make the individual tests more conservative. We limited data analysis to 12 years because of the small number of participant stress tests and laboratory tests beyond this point.

The program's board of directors gave permission to use the data.

RESULTS

Participants

The data from 85 participants were analyzed. Sample sizes across time differed in this study owing to a variety of entry points into the program. Patients in this study had attended the program for a mean of 8 years, with participation ranging from 1 to 18 years. At entry into the program, the mean age of participants was 72.3 (range 44–83) years. Seventy-three of the participants were married; 28 were women and 57 were men. Of the participants, 25% had recurring medical conditions over the course of the program.

On average, participants entered the program with 5 presenting conditions. The top 5 were family history of heart disease (76%), hypercholesterolemia (68%), hypertension (58%), myocardial infarction (45%) and angina (42%) (Table 1).

Table 1. Presenting conditions of 85 participants in the cardiac rehabilitation program

Variable	No. (%) of participants
Family history of heart disease	65 (76)
Hypercholesterolemia	58 (68)
Hypertension	49 (58)
Myocardial infarction	38 (45)
Angina	36 (42)
Orthopedic injury	35 (41)
Inactive lifestyle	33 (39)
Obesity	28 (33)
Angioplasty	26 (31)
Bypass surgery	22 (26)
Diabetes	17 (20)
Atrial fibrillation	12 (14)
Congestive heart failure	8 (9)
Peripheral vascular disease	6 (7)
Cerebrovascular accident	5 (6)
Smoker	4 (5)
Cardiac valve disease	2 (2)

Duration of stress test

Stress test durations are shown in Figure 1. There was significant improvement ($p < 0.01$) in duration compared with the first year of rehabilitation after the cardiac incident up to and including the ninth year of participation, after which there was a decline.

Duration of stress testing increased by a mean of 15% from the first year to the second year of testing, with a corresponding increase in estimated MET level during stress testing (Cohen $d = 0.82$, $p < 0.01$). The increase in duration was sustained into the ninth year (Table 2), with an overall increase in duration of 35% compared with the first year of testing, after which duration and estimated MET levels declined (Fig. 2).

The mean sustained time during the first stress test was 357 seconds, and participants increased this level to a maximum of 519 seconds in the ninth year

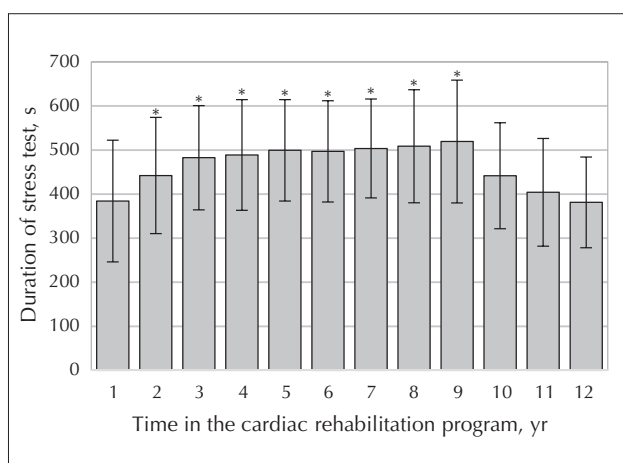


Fig. 1. Mean duration of stress test, by number of years in the program compared with year 1 as the baseline. * $p < 0.01$.

Table 2. Duration of stress test after the first year of participation in the cardiac rehabilitation program

Year	Age, mean, yr	No.	Duration, s; mean $\pm$ SD	Difference from year 1, %
1	66	85	384 $\pm$ 138	–
2	66	85	442 $\pm$ 132	15
3	67	73	483 $\pm$ 118	26
4	67	63	489 $\pm$ 126	27
5	68	54	499 $\pm$ 115	30
6	69	46	497 $\pm$ 115	29
7	69	37	504 $\pm$ 112	31
8	69	34	509 $\pm$ 128	32
9	70	31	519 $\pm$ 139	35
10	71	28	442 $\pm$ 120	15
11	71	26	404 $\pm$ 122	5
12	72	23	381 $\pm$ 103	–1

of participation in the program. Increased duration was also demonstrated in participants with more than 10 years of participation in the program (Fig. 2). The only difference between this long-term group ($n = 26$) and the entire group ($n = 85$) was that a maximum 25.5% increase in duration by the seventh year was observed in the long-term group versus a 35% increase by the ninth year in the overall group.

The typical estimated MET level achieved corresponds to a significant difference from the first year to the 10th year ($p < 0.01$) and a sustained MET level of over 9 from the third year to the ninth year (Fig. 3). This 9-MET level is equivalent to playing racquetball, snowshoeing, swimming or bicycling at about 22.5 km/h.²¹ Considering that the mean MET level from the first stress test was close to 7 METs, this means that there was an improvement of more than 2 METs in a year of participation in the program, and this was maintained over time.

Blood pressure and heart rate

Measurements of pretest and peak blood pressure and heart rate indicate that there was a non-significant change in all measures over the course of program participation. Table 3 shows pretest and peak heart rate measurements over time and demonstrates a typical minor increase with aging for most measurements.^{22,23} These levels are confounded by medication taken to control for high blood pressure and heart rate abnormalities, but the general trend exhibits stable systolic and diastolic blood pressure, heart rate and rate-pressure product measures at both pretest and peak levels.

DISCUSSION

Patients who participated in the cardiac rehabilitation program over long periods (> 1 yr) achieved longer stress test durations and peak estimated MET levels than they achieved at program entry. Long-term participants also maintained stable resting and peak blood pressure and heart rate measurements, even after experiencing recurring cardiovascular events and orthopedic challenges. Our results demonstrate that long-term participation in a cardiac rehabilitation program is associated with these benefits and that the benefits can be maintained for more than a decade. It is possible, even in a rural setting, to develop and sustain a cardiac rehabilitation program that encourages long-term participation.

Most participants in cardiac rehabilitation programs at other centres complete between 6 weeks

and 18 months, depending on the program, and are sent back to attempting regular exercise without clinical supervision.^{6,17,23,24} The finding that staying in a clinically supervised program prolongs the ability to sustain MET levels suggests that the third phase (the 6–18 mo program) and ultimately the fourth phase (the independent exercise program) of reintegration back to nonclinically supervised independent exercise should be reconsidered. Long-term participation in clinically monitored classes was found to encourage regular involvement in physical activity. This sustained MET level achieved continuity of health benefits beyond that seen in other published research on cardiac rehabilitation programs to date. Further research is required to understand the reasons the program encouraged participants to stay motivated for this long duration. In addition, research should investigate why there is a gradual reduction in duration after the ninth year.

The proportion of women experiencing cardiovascular events that make them eligible for these programs is known to be greater than the proportion of men, but female participation rates are historically low.²⁵ This study corroborates this finding, with men outnumbering women 3 to 1. Future research should determine the barriers experienced by women, the removal of which may assist women in participation.

Most of the previous research reporting on health and physical activity after participation in a cardiac rehabilitation program for up to 12 weeks demonstrate an improvement in the patient's aerobic

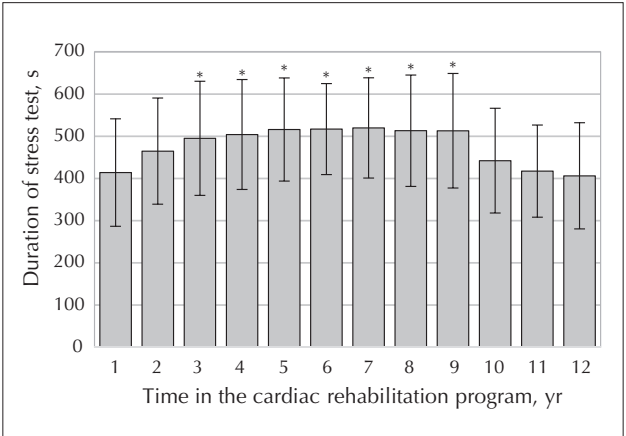


Fig. 2. Mean duration of stress test in participants with more than 10 years of program participation ($n = 26$), by number of years in the program compared with year 1 as the baseline. * $p < 0.01$.

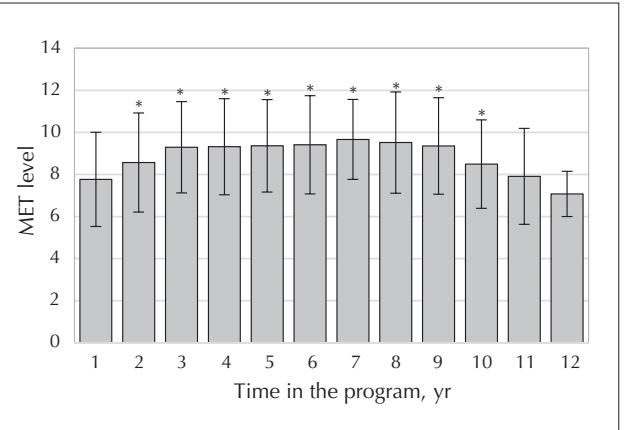


Fig. 3. Mean change in estimated MET level, by number of years in the program compared with year 1 as the baseline. * $p < 0.01$. MET = metabolic equivalent of task.

Table 3. Pretest and peak measurements of heart rate and blood pressure over time

Year	Heart rate, beats/min		Diastolic blood pressure, mm Hg		Systolic blood pressure, mm Hg		Rate-pressure product	
	Pretest	Peak	Pretest	Peak	Pretest	Peak	Pretest	Peak
1	66	123	74	77	126	165	83	205
2	65	122	73	77	124	166	80	203
3	66	126	73	77	125	172	82	218
4	66	124	73	76	125	165	82	206
5	65	124	73	80	125	167	81	209
6	65	125	76	79	128	168	83	212
7	66	125	73	78	128	169	84	213
8	66	127	74	78	127	172	84	221
9	68	127	75	79	134	171	92	220
10	70	130	77	80	131	165	92	219
11	68	122	74	77	133	162	91	199
12	74	124	79	78	135	168	100	206

capacity at the end of the program and relatively stable but declining aerobic capacity for the 2 years studied after the end of the program.⁴ However, it is known that long-term participation in leisure-time physical activity 12 years after a myocardial infarction reduces the risk of death by half when compared with inactive patients, irrespective of habits before myocardial infarction.⁶ This rural cardiac rehabilitation program is an example of what people will choose to do given the option of staying in a program after experiencing a cardiac event.

What is the explanation for most patients reducing exercise or becoming inactive after participation in a cardiac rehabilitation program? Some researchers have suggested that barriers to participation such as travel, physical health and personal or family problems are a reason for stopping participation.^{13,15} This struggle to exercise is similar in any other person who is able-bodied or experiencing a disability.^{13,15,26} However, in the current study, participants averaged 9 years or more in monitored classes, with some participants remaining in the program since its inception 18 years previously. Research on why participants do travel and enjoy the cardiac rehabilitation program would be beneficial.

It was the intent of this study to examine restorative and deteriorative health indicators of the participants. Because of numerous studies confirming improved physical conditioning and health outcomes, some results were anticipated, such as stable pretest and peak rate-pressure product, blood pressure and heart rate. In this study, we found a restorative health result over a 9-year period. Long-term participation in a clinically supervised cardiac rehabilitation program is likely to result in the maintenance of benefits observed in physiologic markers as well as a reduction in cardiovascular morbidity and mortality. To confirm this observation would require a prospective, randomized trial with intention-to-treat follow-up of participants and dropouts.

What might be important to consider, particularly in a rural community with limited resources, is the benefit of physical activity in preventing or slowing the trajectory of other chronic diseases. Booth and colleagues,²⁷ in a very extensive literature review of 35 chronic diseases, concluded that lack of physical activity was a causal factor. These chronic diseases, which are most prevalent in older adults, include colon and breast cancer, diabetes, osteoporosis, balance problems and falls, rheumatoid arthritis and stroke. Therefore, maintaining attendance in a cardiac rehabilitation program beyond the normal time frame may have a myriad of

benefits and potentially be a very cost-effective way to treat other chronic conditions. In a rural community where there may be the resources for only 1 exercise program, it may be advisable not only to encourage cardiac patients to continue, but also to invite other older adults to join as well. The program described here is potentially an important resource in the treatment of many other conditions.

Limitations and strengths

The most obvious limitation was that there were no control groups. In addition, researchers conducting retrospective studies cannot control exposure or outcome assessment because other individuals have completed the record keeping. It is fortunate that this study minimized the recorded outcome and stress test stop time exposure by using the same physician to conduct the stress tests over most of the study period. There was also continuity of clinical instructors over the course of the program.

Samples and sample sizes across time differed in this study owing to a variety of entry points into the program. This meant that a true repeated-measures design was not possible. A Wilcoxon signed-rank test using a p value of 0.01 for tests of significance was performed on data to offset this heteroscedasticity.

One last area that was out of the control of researchers was the medication effect on stress test outcome variables. The pilot study showed that there was no record of medication compliance over time nor was there an analysis technique that could control for medication use.

The strengths of this study and program are numerous. The program leaders and medical director have served for more than 15 of the 20 years the program has been in existence. Clinical instructors remained consistent and the class has been held in the same recreation facility for 15 of the 20 years, creating an atmosphere that encourages health and well-being.

CONCLUSION

Participants in the cardiac rehabilitation program demonstrated improved duration of stress testing, and stable rate-pressure product, blood pressure and resting heart rate during long-term participation in the program. Lack of exercise is a major cause of chronic disability.²⁷ Long-term clinically supervised cardiac rehabilitation programs are beneficial in improving aerobic fitness levels beyond the typical program duration of 6 weeks to 18 months.

Benefits of stabilized heart rate and blood pressure markers as well as typical laboratory measures can be maintained for many years. This rural program is a model for others, including governments, to emulate and support. With limited resources, rural communities struggle to maintain health promotion and rehabilitation programs. This study reports on a success story that is perhaps worth emulating in other communities.

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Competing interests: None declared.

REFERENCES

- Frederix I, Van Driessche N, Hansen D, et al. Increasing the medium-term clinical benefits of hospital-based cardiac rehabilitation by physical activity telemonitoring in coronary artery disease patients. *Eur J Prev Cardiol* 2015;22:150-8.
- Powell LH, Calvin JE Jr., Mendes de Leon CF, et al. The Heart Failure Adherence and Retention Trial (HART): design and rationale. *Am Heart J* 2008;156:452-60.
- Sangster J, Furber S, Phongsavan P, et al. Where you live matters: challenges and opportunities to address the urban-rural divide through innovative secondary cardiac rehabilitation programs. *Aust J Rural Health* 2013;21:170-7.
- Stone JA, Arena R, Hauer T, et al. Long-term retention of aerobic fitness improvements following participation in cardiac rehabilitation. *Int J Cardiol* 2011;150:355-6.
- Taylor RS, Brown A, Ebrahim S, et al. Exercise-based rehabilitation for patients with coronary heart disease: systematic review and meta-analysis of randomized controlled trials. *Am J Med* 2004;116:682-92.
- Gerber Y, Myers V, Goldbourt U, et al. Long-term trajectory of leisure time physical activity and survival after first myocardial infarction: a population-based cohort study. *Eur J Epidemiol* 2011;26:109-16.
- Herman R, Liebergall M, Rott D. Correlation between participation in a cardiac rehabilitation program and quality of life of patients with coronary artery disease. *Rehabil Nurs* 2014;39:192-7.
- Saeidi M, Mostafavi S, Heidari H, et al. Effects of a comprehensive cardiac rehabilitation program on quality of life in patients with coronary artery disease. *ARYA Atheroscler* 2013;9:179-85.
- Turk-Adawi KI, Oldridge NB, Tarima SS, et al. Cardiac rehabilitation patient and organizational factors: What keeps patients in programs? *J Am Heart Assoc* 2013;2:e000418.
- Turk-Adawi KI, Oldridge NB, Tarima SS, et al. Cardiac rehabilitation enrollment among referred patients: patient and organizational factors. *J Cardiopulm Rehabil Prev* 2014;34:114-22.
- Fletcher SM, Burley MB, Thomas KE, et al. Feeling supported and abandoned: mixed messages from attendance at a rural community cardiac rehabilitation program in Australia. *J Cardiopulm Rehabil Prev* 2014;34:29-33.
- Adsett J, Hickey A, Nagle A, et al. Implementing a community-based model of exercise training following cardiac, pulmonary, and heart failure rehabilitation. *J Cardiopulm Rehabil Prev* 2013;33:239-43.
- Ghisi GL, dos Santos RZ, Aranha EE, et al. Perceptions of barriers to cardiac rehabilitation use in Brazil. *Vasc Health Risk Manag* 2013;9:485-91.
- Shanmugasagaram S, Oh P, Reid RD, et al. A comparison of barriers to use of home- versus site-based cardiac rehabilitation. *J Cardiopulm Rehabil Prev* 2013;33:297-302.
- de Melo Ghisi GL, Oh P, Benetti M, et al. Barriers to cardiac rehabilitation use in Canada versus Brazil. *J Cardiopulm Rehabil Prev* 2013;33:173-9.
- Ayabe M, Brubaker PH, Dobrosielski D, et al. The physical activity patterns of cardiac rehabilitation program participants. *J Cardiopulm Rehabil* 2004;24:80-6.
- Forhan M, Zagorski BM, Marzonlini S, et al. Predicting exercise adherence for patients with obesity and diabetes referred to a cardiac rehabilitation and secondary prevention program. *Can J Diabetes* 2013;37:189-94.
- Korzeniowska-Kubacka I, Bilinska M, Dobraszkievicz-Wasilewska B, et al. Comparison between hybrid and standard centre-based cardiac rehabilitation in female patients after myocardial infarction: a pilot study. *Kardiol Pol* 2014;72:269-74.
- Hansen D, Dendale P, Raskin A, et al. Long-term effect of rehabilitation in coronary artery disease patients: randomized clinical trial of the impact of exercise volume. *Clin Rehabil* 2010;24:319-27.
- Balady GJ, Ades PA, Comoss P, et al. Core components of cardiac rehabilitation/secondary prevention programs: a statement for healthcare professionals from the American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation Writing Group. *Circulation* 2000;102:1069-73.
- Grace SL, Gravely-Witte S, Kayaniyl S, et al. A multisite examination of sex differences in cardiac rehabilitation barriers by participation status. *J Womens Health (Larchmt)* 2009;18:209-16.
- Ainsworth BE, Haskell WL, Leon AS, et al. Compendium of physical activities: classification of energy costs of human physical activities. *Med Sci Sports Exerc* 1993;25:71-80.
- AlGhatrif M, Lakatta EG. The conundrum of arterial stiffness, elevated blood pressure, and aging. *Curr Hypertens Rep* 2015;17:12.
- Spronck B, Heusinkveld MH, Donders WP, et al. A constitutive modeling interpretation of the relationship among carotid artery stiffness, blood pressure, and age in hypertensive subjects. *Am J Physiol Heart Circ Physiol* 2015;308:H568-82.
- Davidson KW, Burg MM, Carney RM, et al. Exercise, cardiac rehabilitation, and post-acute coronary syndrome depression — reply. *JAMA Intern Med* 2014;174:166-7.
- Mair V, Breda AP, Nunes ME, et al. Evaluating compliance to a cardiac rehabilitation program in a private general hospital. *Einstein (Sao Paulo)* 2013;11:278-84.
- Booth FW, Roberts CK, Laye MJ. Lack of exercise is a major cause of chronic diseases. *Compr Physiol* 2012;2:1143-211.

Should I apply to medical school? High school students and barriers to application

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Introduction: A major goal of the Faculty of Medicine at the Memorial University of Newfoundland is to produce physicians who will return to rural areas that are currently underserved. Research shows that the strongest indicator of practice in a rural area is a rural background, and thus it is important that rural students apply to medical school. We investigated what high school students believe to be preventing them from pursuing medical education.

Methods: Between September 2013 and June 2014, we administered a paper survey to high school students in Newfoundland and Labrador, New Brunswick and Prince Edward Island.

Results: A total of 665 participants completed the survey. We found that fewer rural students (75.6%) than urban students (98.6%) believed that they could gain admission to medical school ($p < 0.01$) and that medicine was promoted as a career choice in fewer rural schools (55.7%) than urban schools (69.7%). Also, 55.4% of urban students, but only 44.4% of rural students, believed that rural students were disadvantaged when applying to medical school.

Conclusion: In our study, rural students believed they were less likely to be accepted into medical school than urban students, and fewer rural students felt that medicine was promoted as a potential career choice. Our results may be explained by a lack of role models or perhaps by financial barriers, although further research is needed.

Introduction : Un des grands objectifs de la Faculté de médecine de l'Université Memorial de Terre-Neuve est de former des médecins qui retourneront exercer dans les zones rurales qui sont actuellement mal desservies. Des études ont démontré que le facteur le plus fortement associé au choix de la pratique en milieu rural est le fait d'y avoir habité; il est donc important que des jeunes ruraux entrent en faculté de médecine. Nous avons demandé à des élèves de niveau secondaire ce qui pourrait les empêcher de poursuivre des études en médecine.

Méthodes : Entre septembre 2013 et juin 2014, nous avons invité des élèves de Terre-Neuve-et-Labrador, du Nouveau-Brunswick et de l'Île-du-Prince-Édouard à répondre à un sondage papier.

Résultats : Le sondage a été réalisé auprès de 665 répondants. Les élèves en milieu rural (75,6 %) sont moins nombreux que les élèves en milieu urbain (98,6 %) à croire en leurs chances d'être admis en médecine ($p < 0,01$). De plus, la promotion de la profession médicale à l'école serait moins répandue en milieu rural (55,7 %) qu'en milieu urbain (69,7 %). Finalement, 55,4 % des élèves en milieu urbain et seulement 44,4 % des élèves en milieu rural croient que le milieu représente un frein à l'admission en médecine.

Conclusion : En résumé, les élèves du milieu rural croient que les citadins sont plus susceptibles d'être admis en médecine, et ils sont moins nombreux à dire que leur école les a encouragés à faire carrière dans ce domaine. Nos résultats pourraient s'expliquer par un manque de modèles ou des contraintes financières; il faudra approfondir la recherche à ce sujet.

INTRODUCTION

In Newfoundland and Labrador, a very sparsely populated province, there is an increasing demand for physicians of all specialties to return to rural areas and provide medical care. With 42% of Canada's population living in rural areas and only 13.4% of Canada's doctors practising rurally, there is a growing demand for physicians to expand from the major health care hubs to reach underserved rural populations.¹ Despite recent increases in the number of physicians practising in rural locations in Canada,² many rural and isolated communities in the province of Newfoundland and Labrador remain underserved^{1,3} owing to an inadequate supply of practitioners. A major goal of the Faculty of Medicine at the Memorial University of Newfoundland is to produce physicians who will return to rural areas of Newfoundland and Labrador, and to rural Canada in general. Research shows that the strongest indicator of practice in a rural area is a rural background.^{4,5} Thus, it is important that there be a sizeable portion of applicants with a rural background. The overall aim is that these students will eventually return to practise in rural and remote communities.^{4,6-10} Medical schools focused on rural retention want to increase enrolment of rural applicants,^{5,11} yet it appears that rural students are still not pursuing a career in medicine.

Scrutiny of the procedure for application to medical school has sparked a belief that the process followed by admission committees is biased in favour of urban students. However, research suggests that no partiality exists in the application procedure and that the problem lies in fewer rural students applying.¹² Studies have been conducted with medical students and residents in an effort to ascertain what they feel are barriers to the pursuit of a career in medicine. Specifically, it has been found that rural students are older, come from families with lower socioeconomic status, and experience more stress over debt and financial matters.¹³ It has also been found among high school students in southwestern Ontario that the factors preventing respondents from applying were competitiveness, low grades and affordability.¹⁴ Other researchers speculate that the limited representation of rural students in medical school applications in Ontario could be related to the lack of role models in rural areas, as well as financial barriers.¹⁵ Data are lacking to confirm these speculations in Ontario, and a lack of evidence exists to explain why a similar trend of misrepresentation of rural candidates is

occurring in other provinces, such as Newfoundland and Labrador.

We investigated what high school students, from both rural and urban areas, believe to be preventing them from pursuing medical education in Newfoundland and Labrador. We looked at whether rural students have a perception that they are less likely to be admitted and therefore do not consider medicine as a potential career. We believe that students in this province are in a unique situation in that the spike in tuition fees that deterred students in Ontario¹⁶ may not have affected Memorial University, where tuition rates are among the lowest in the country.¹⁷ Knowledge of the barriers that prevent students from applying to medical school is paramount in addressing the issue of recruitment of more applicants from rural areas. Overcoming these barriers could subsequently lead to an increased number of rural physicians for a predominantly rural province.

METHODS

Participants

We targeted high school students living in Newfoundland and Labrador, New Brunswick and Prince Edward Island who were interested in post-secondary education. Rather than calculating a sample size, we used a convenience sample of students from schools in these provinces to obtain a large and representative sample.

Participants were included if they were in high school, indicated interest in postsecondary training and were attending a school in a community where first-year medical students were completing a clinical placement. Additional participants were recruited through a health care career-development program called Med-QUEST at Memorial University in St. John's, NL.

Survey design and content

Between September 2013 and June 2014, medical students administered a paper survey consisting of closed-ended, rank-based questions and open-ended opinion questions based on consultation with content experts in the field. Before completing the survey, high school students received a 1-hour presentation about Memorial University and its Faculty of Medicine from medical students attending a clinical placement in their community.

The survey consisted of 17 questions that focused on key areas, including exposure to medicine,

ideas regarding admission, perceived barriers to attending medical school for all students and perceived barriers that may be specific to rural students. The rank-based questions used an ordinal scale of 1 to 10, where responses of 1 to 5 were interpreted as disagreement and responses of 6 to 10 were interpreted as agreement. Participants were asked to provide only their school district and birth-date to remain anonymous.

Data management and analysis

Quantitative data were entered into SPSS, version 22. Personal identifiers were removed during data input, and all electronic data were stored on a password-protected computer. Paper copies of the survey were stored in a locked room in a faculty member's office. Missing survey data (unanswered questions) were not imputed and remained empty.

Appropriate statistical calculations were computed, including frequency analysis and χ^2 tests (95% confidence interval) to determine differences and trends, respectively. Open-ended questions were collected and stored for later analysis.

This study was initiated as a quality-improvement project and therefore did not require ethics approval from the health research ethics board.

RESULTS

Participant characteristics

A total of 665 participants completed the survey. The mean age of respondents was 16.83 (standard deviation 0.89) years. Of the participants, 5.4% were 15 years of age, 32.2% were 16, 37.6% were 17, 23.7% were 18, 1.0% were 19 and 0.2% were 20.

More participants resided in a rural area (88.0%, $n = 585$) than in an urban area (12.0%, $n = 80$). A geographic breakdown revealed that most students sampled resided in central Newfoundland (29%, $n = 190$) followed by western Newfoundland (22.1%, $n = 147$), the Avalon Peninsula (15.0%, $n = 100$), other Atlantic Canadian provinces (13.8%, $n = 92$), eastern Newfoundland (12.6%, $n = 84$) and Labrador (6.6%, $n = 44$).

Exposure to medicine as a career

Overall, 62.4% of students had attended a presentation on medicine in the past, whereas 37.6% had not. Students who had attended a presentation in the past were more likely to come from a rural com-

munity (92.0%) than an urban community (8.0%) ($p < 0.01$). Rural students (64.8%) were more likely than urban students (43.4%) to have previously attended a presentation on medicine ($p < 0.01$).

As a cohort, 57.3% of students believed that medicine was promoted at their school as a career choice. Investigation into the differences between rural and urban samples revealed that 69.7% of urban students believed medicine was promoted at their school, whereas 55.7% of rural students believed that it was promoted at their school ($p < 0.05$).

Beliefs about a career in medicine

Significant differences existed between rural and urban students in their perception of gaining admission to medical school. Overall, 78.2% of all students surveyed felt they could be accepted. Fewer rural students (75.6%) than urban students (98.6%) believed that they could gain admission to medical school ($p < 0.01$). Interestingly, 55.4% of urban students, but only 44.4% of rural students, believed that rural students were disadvantaged when applying to medical school.

Beliefs on working in rural medicine

As an entire group, 41.2% of students were interested in a career in rural medicine. However, differences existed between the rural and urban groups; 43.0% of rural students were interested in a career in rural medicine but only 27.0% of urban students were interested in rural medicine ($p < 0.01$) (Table 1).

Financial worries and role models

Although this was not addressed in the survey, students alluded to financial worries being a barrier in the open-ended questions.

The survey also indicated that role models were lacking for the promotion of rural medicine.

DISCUSSION

The purpose of this cross-sectional survey of high school students in Atlantic Canada was to determine whether rural students perceived barriers to applying to medical school and to identify the types of barriers these students felt existed. The underrepresentation of rural applicants at Memorial University is similarly felt across the country, and promotion of rural students may encourage rural practice, which is a desired outcome for most

Canadian provinces. To our knowledge, this is the first study focusing on the barriers specific to rural students in the Atlantic provinces.

Health care promotion at the high school level

Role models and mentors are key elements in individual development throughout many career paths. Having a positive role model can spark interests and influence career choices. It has been proposed that young people who do not grow up having strong relationships with health care professionals lack motivation to follow their path and pursue medicine.¹⁵

Rural areas in Newfoundland and Labrador, more than anywhere else in Canada, rely on provisionally licensed international medical graduates (IMGs) to service isolated communities. These IMGs often spend less than 5 years in their assigned communities before they emigrate within Canada, often to bigger centres in Ontario.¹⁸ This results in a high turnover of family physicians in rural areas, which means that residents of the area are unable to form positive, lasting doctor–patient relationships.

Results of this study indicate that rural students lacked school administrative personnel or physician community role models who promoted medicine as a career during their high school years. We speculate that this deficit, along with the lack of strong doctor–patient relationships often seen in these areas influence whether rural students decide to apply to medical school.

Expected acceptance

Although rural students lacked personnel who promoted medicine as a career, they did more frequently report that they received information sessions about medical school when compared with

their urban counterparts. Despite increased exposure, rural students did not report a subsequent stimulation in interest in pursuing a career in medicine. Although more rural students were reached than urban students, rural students still felt that it was less likely that their application to medical school would be accepted (75.6% of rural students v. 98.6% of urban students). This finding is counter-intuitive; the expectation is that high rates of exposure to medical school presentations would lead to higher perception of success on admission. This follows from cognition and learning theory, whereby more exposure and reinforcement make people more comfortable with a process.¹⁹

Willingness to return

Previous research by Mathews and colleagues^{4,5} indicates that coming from a rural community is one of the biggest drivers to eventual return to practise in a rural area; a finding that is also supported by our data. In the 41.2% of total surveyed students who were interested in rural medicine, more rural students than urban students reported willingness to return to a rural area. We believe this can be attributed to the possibility that rural students are more exposed to the need for medical care in their communities and have a more developed understanding of the barriers to rural primary care. Therefore, rural students may have more deep-seated motivations to service these areas. Additionally, it is possible that urban students are unaware of the rural lifestyle and therefore see it as an unknown territory that they are less apt to explore. These data further emphasize the need for rural recruitment efforts to facilitate future service in rural areas of Newfoundland and Labrador and the rest of Canada.

Table 1. Survey results from high school students, by rural or urban residence

Variable	% who agreed		χ^2 value	<i>p</i> value
	Rural	Urban		
Attended a presentation on medicine in the past	<i>n</i> = 581 64.8	<i>n</i> = 76 43.4	12.21	< 0.01
Believed medicine is promoted as a career choice	<i>n</i> = 575 55.7	<i>n</i> = 76 69.7	4.82	< 0.05
Believed could gain acceptance to medical school	<i>n</i> = 569 75.6	<i>n</i> = 73 98.6	18.76	< 0.01
Believed rural students are at a disadvantage when applying to medical school	<i>n</i> = 579 44.4	<i>n</i> = 74 55.4	2.77	> 0.9
Would be interested in a career in rural medicine	<i>n</i> = 582 43.0	<i>n</i> = 74 27.0	6.29	< 0.05

Limitations

There are limitations associated with this study. We used a convenience sample; medical students on rural rotations completed the presentation and administered the surveys. Therefore, the data have a misrepresentation of rural compared with urban students. Additionally, not all presentations were mandatory for students; consequently, it is possible that the sample population is biased to students already interested in medicine as a future career. Another limitation is that data were not analyzed using specific demographics, such as age and sex.

Financial stress as a direct barrier was not addressed in the quantitative aspect of the survey; however, students alluded to this barrier in the open-ended questions. Our data provide an opportunity for further examination into financial barriers in future analysis. We wish to decipher whether rural students face greater financial stress than their urban counterparts when considering medical school. In future research, this information could enhance our understanding of the types of students who perceive different barriers.

CONCLUSION

One of the most important findings in our data was that rural students believe they are less likely to get into medical school than urban students, and of these students, fewer felt that medicine was promoted as a potential career choice. The limited promotion of medicine during high school may have a greater influence on likelihood for medical school application than previously suggested in the literature. It is therefore our recommendation that medicine be promoted as a career option in rural high schools. Our research identified and confirmed application barriers perceived by high school students. An important area for future research would be to assess whether rural students who apply are obtaining acceptance and to decipher whether the barriers these students report are real or perceived.

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Competing interests: None declared.

REFERENCES

1. Mathews M, Edwards AC. Having a regular doctor: rural, semi-urban and urban differences in Newfoundland. *Can J Rural Med* 2004;9:166-72.
2. *Supply, distribution and migration of Canadian physicians*. Ottawa: Canadian Institute for Health Information; 2012.
3. Mathews M, Edwards A, Rourke J. Retention of provisionally licensed international medical graduates: a historical cohort study of general and family physicians in Newfoundland and Labrador. *Open Med* 2008;2:e62-9.
4. Mathews M, Rourke J, Park A. The contribution of Memorial University's medical school to rural physician supply. *Can J Rural Med* 2008;13:15-21.
5. Mathews M, Rourke JT, Park A. National and provincial retention of medical graduates of Memorial University of Newfoundland. *CMAJ* 2006;175:357-60.
6. Rourke J. WHO recommendations to improve retention of rural and remote health workers-important for all countries. *Rural Remote Health* 2010;10:1654.
7. Chan BT, Degani N, Crichton T, et al. Factors influencing family physicians to enter rural practice: Does rural or urban background make a difference? *Can Fam Physician* 2005;51:1246-7.
8. Rourke J. How can medical schools contribute to the education, recruitment and retention of rural physicians in their region? *Bull World Health Organ* 2010;88:395-6.
9. Rourke JT, Incitti F, Rourke LL, et al. Relationship between practice location of Ontario family physicians and their rural background or amount of rural medical education experience. *Can J Rural Med* 2005;10:231-40.
10. Wilson NW, Couper ID, De Vries E, et al. A critical review of interventions to redress the inequitable distribution of healthcare professionals to rural and remote areas. *Rural Remote Health* 2009;9:1060.
11. Raghavan M, Martin BD, Roberts D, et al. Increasing the enrolment of rural applicants to the faculty of medicine and addressing diversity by using a priority matrix approach to assign values to rural attributes. *Rural Remote Health* 2011;11:1646.
12. Wright B, Woloschuk W. Have rural background students been disadvantaged by the medical school admission process? *Med Educ* 2008;42:476-9.
13. Kwong JC, Dhalla IA, Streiner DL, et al. A comparison of Canadian medical students from rural and non-rural backgrounds. *Can J Rural Med* 2005;10:36-42.
14. Cassidy K, Foster T, Moody E, et al. Perceptions of medical school among high school students in southwestern Ontario. *Can J Rural Med* 2013;18:7-12.
15. Hutten-Czapski P, Pitblado R, Rourke J. Who gets into medical school? Comparison of students from rural and urban backgrounds. *Can Fam Physician* 2005;51:1240-1.
16. Frenette M. *The impact of tuition fees on university access: evidence from a large-scale price deregulation in professional programs*. No. 2005263e. Ottawa: Statistics Canada, Analytical Studies Branch; 2005.
17. *Canadian medical education statistics 2015*. Ottawa: The Association of Faculties of Medicine of Canada; 2015. Available: www.afmc.ca/sites/default/files/CMES2015-reduced.pdf (accessed 2015 October).
18. Audas R, Ryan A, Vardy D. Where did the doctors go? A study of retention and migration of provisionally licensed international medical graduates practising in Newfoundland and Labrador between 1995 and 2006. *Can J Rural Med* 2009;14:21-4.
19. Shanks DR. Learning: from association to cognition. *Annu Rev Psychol* 2010;61:273-301.

The occasional digital nerve block

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reviewed.*

In performing regional anesthesia of the fingers and hand, there are several general principles that need to be identified. The first is to relax. Successful blocks get easier with repetition. Most rural physicians do not perform them weekly or monthly, so it may take a while to get comfortable with them, and repeat blocks may be required for any given procedure.

PRELIMINARY PRECAUTIONS

1. Ensure that you have performed and documented any neurologic and vascular assessment before injection. Most injections will be performed with a 25-gauge needle. Because the needle will often be adjacent to an artery, aspiration before injection is needed. Paresthesia on initial needle placement indicates that the needle is in the nerve, and withdrawing slightly until it is absent identifies a safe injection site. Paresthesia does occur (older texts routinely used them as "landmarks"), so be slow and cautious with the pace of the needle insertion and injection.
2. Epinephrine containing anesthetic agents should not be used. There has recently been some debate about this in the fields of orthopedic and plastic hand surgery; a changing practice is developing in which epinephrine is being used along with a local anesthetic.¹⁻³ This change in practice does not necessarily extend medicolegally to the rural practitioner, when most textbooks still clearly admonish the use of epinephrine, particularly in finger anesthesia.^{4,5}

3. The traditional ring block for digital nerve anesthesia is no longer a preferred technique owing to its lower safety profile from the tourniquet effect of anesthetic volume used.⁶
4. Use of lidocaine is common. If multiple injections are used, the toxicity range of 4 mg/kg needs to be considered (e.g., 20 mL total of 1% lidocaine may be toxic for a 50-kg patient if it rapidly becomes intravascular; 10 mL for a 2% solution). Toxicity is less of a concern when instilled into soft tissue, where it will be slowly absorbed and metabolized. Toxicity is more likely to be an issue with a hematoma block, which typically involves use of larger volumes and may function as a rapidly absorbed intraosseous infusion. This toxicity presents with a metallic taste in the mouth and may be followed by a seizure. Bupivacaine is a common, longer-acting equivalent choice for finger and hand anesthesia.

Digital nerve block is not synonymous with ring block.^{7,8} Remember that there is a volar and a dorsal digital nerve on each digit. They bifurcate just proximal to the metacarpophalangeal joint, the visible knuckle. Finger anesthesia can be performed in 3 ways: web-space block, metacarpophalangeal block and ring block.

EQUIPMENT

- 25-gauge 3/4-inch needle
- lidocaine

WEB-SPACE BLOCK

This block is the easiest to perform and has been found to be the most effective digital block.⁹ Simply insert a 25-gauge,

3/4-inch needle completely into the web space. Insert to a depth of about 1 inch and inject 3 mL of lidocaine (Fig. 1). This will likely reach both aspects of the digital nerve at or near their bifurcation.

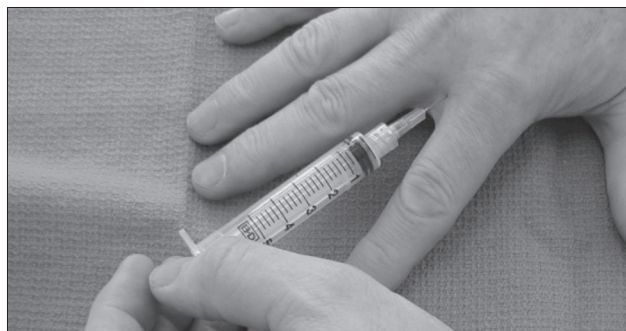


Fig. 1. Web-space block: insert to a depth of about 1 inch.

METACARPOPHALANGEAL BLOCK

Metacarpophalangeal block is performed on the dorsum of the hand just proximal to the visible knuckle joint.¹⁰ The needle is entered perpendicular to the skin, behind the visible knuckle, and advanced until the palmar aponeurosis is felt or the palmar skin is tenting. Then instill 3 mL of lidocaine (Fig. 2). Some clinicians enter the skin at an angle and advance the needle toward the web space until the needle is seen tenting there and then inject a similar volume.⁷ Some lidocaine can be kept and used when the needle is almost out of the skin to tunnel subcutaneously across the metacarpophalangeal area and deposit a subcutaneous wheal, so that the entry point of the second injection is anesthetized in advance. The other side of the metacarpophalangeal area is entered in the same fashion with another 3 mL of lidocaine instilled.



Fig. 2. Metacarpophalangeal block: enter behind the visible knuckle and aim for the web space at the palm.

RING BLOCK

Because there is no place for fluid to expand as in the previous approaches, this commonly employed

method may leave the patient exposed to a potential compartment syndrome.^{7,8} Use it cautiously and not at all in patients with poor vascular health. The classic approach is 1–1.5 mL of lidocaine on each side of the digit.¹¹ The needle enters the dorsal finger skin just distal to the web space and the 1-mL volume is injected, partly at the dorsal branch and then further advanced to the volar branch of the digital nerve. The needle basically slides along the side of the finger as each nerve receives an injection. The total volume in the finger should total 3 mL or less (Fig. 3).



Fig. 3. Ring block: move the needle to reach both the dorsal and volar branches of the digital nerve.

Competing interests: None declared.

REFERENCES

1. Chowdhry S, Seidenstricker L, Cooney D, et al. Do not use epinephrine in digital blocks: Myth or truth? Part II. A retrospective review of 1111 cases. *Plast Reconstr Surg* 2010;126:2031-4.
2. Thompson CJ, Lalonde D, Denkler K, et al. A critical look at the evidence for and against elective epinephrine use in the finger. *Plast Reconstr Surg* 2007;119:260-6.
3. Lalonde D, Martin A. Epinephrine in local anesthesia in finger and hand surgery: the case for wide awake anesthesia. *J Am Acad Orthop Surg* 2013;21:443-7.
4. New York School of Regional Anesthesia. Digital nerve block. 2013. Available: www.nysora.com/techniques/nerve-stimulator-and-surface-based-ra-techniques/upper-extremity/3023-digital-nerve-block.html (accessed 2015 Nov. 19).
5. Volfson D. *Anesthesia, regional, digital block*. New York: Medscape; 2015. Available: <http://emedicine.medscape.com/article/80887-overview#a5> (accessed 2015 Nov. 18).
6. Family Practice Notebook. Digital block. www.fpnotebook.com/surgery/pharm/DgtlBlck.htm (accessed 2015 Nov. 18).
7. Thompson WL, Malchow RJ. Peripheral nerve blocks and anesthesia of the hand. *Mil Med* 2002;167:478-82.
8. Schwartz SI, Shires GT, Spencer FC, et al. *Principles of surgery*. 7th ed. New York: McGraw-Hill; 1999.
9. Knoop K, Trott A, Syverud S. Comparison of the digital versus metacarpal blocks for repair of finger injuries. *Ann Emerg Med* 1994;23:1296-300.
10. Smith DW, Peterson MR, DeBerard C. Regional anesthesia: nerve blocks of the extremities and face. *Postgrad Med* 1999;106:69-73, 77-8.
11. Salam GA. Regional anesthesia for office procedures: part II. Extremity and inguinal area surgeries. *Am Fam Physician* 2004; 69:896-900.

Country cardiograms case 56

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This article has been peer
reviewed.

A 75-year-old woman is brought by ambulance to a remote emergency department in the winter. She appears overwhelmingly distressed, having been assaulted by a family member and then having had to escape outside into the snow and run for help. She mentions that she is having

central chest pain. The electrocardiogram (ECG) shown in Figure 1 is recorded. What are the ECG findings, and what are the possible diagnoses?

For the answer, see page 54.

Competing interests: None declared.

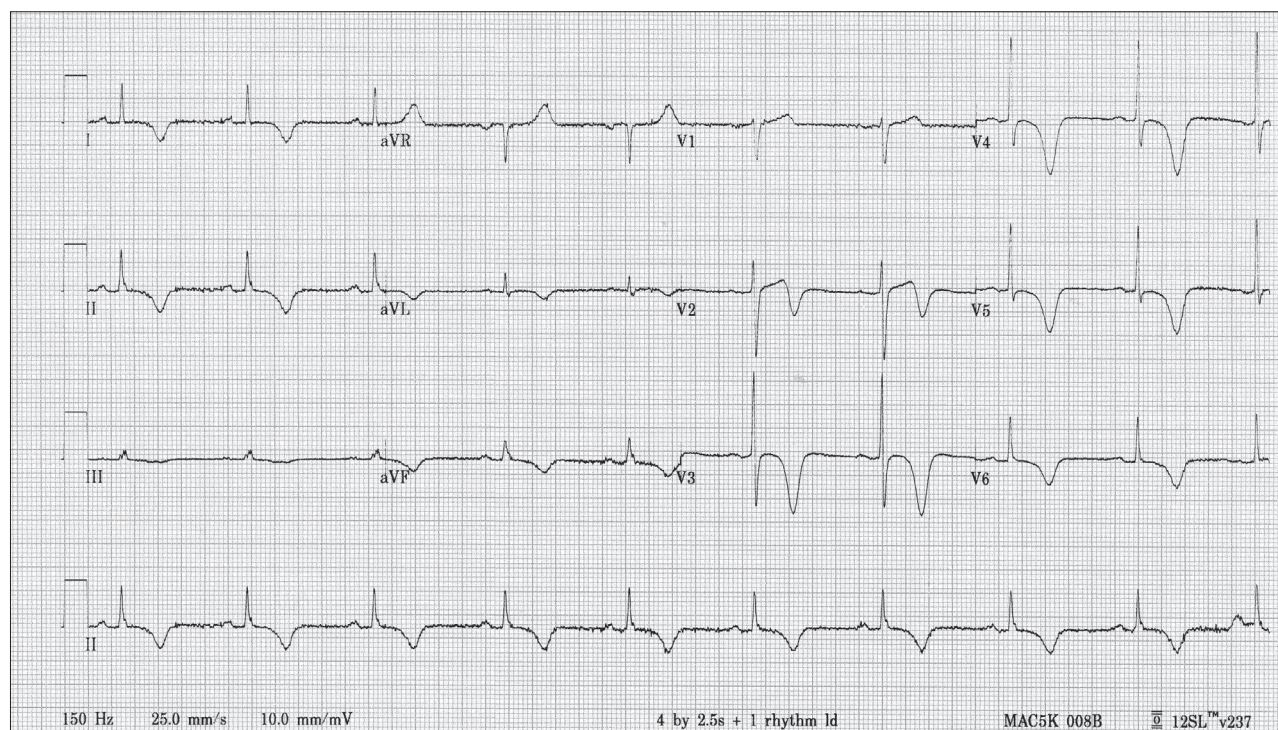


Fig. 1. Electrocardiogram of a 75-year-old woman with central chest pain.

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

Country cardiograms case 56: Answer

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Sinus bradycardia is present, with a heart rate of 56 beats/min. The PR interval, QRS duration, QT interval, axis, P waves and QRS morphology are all within normal limits. The obvious, striking abnormality lies in the T waves. Deep, symmetric T-wave inversion is present in leads I, aVL, II, aVF and V2 through V6. ST segments are slightly depressed and down-sloping in most of these leads. These generalized changes in the electrocardiogram (ECG) contribute to a diagnosis of ischemia.

The patient's troponin levels rose to 361 ng/L (results of 100–2000 ng/L suggest that acute myocardial infarction [MI] is likely). She is treated as having a non-ST elevation MI and is transferred to a larger centre for further investigation and treatment.

Coronary angiography shows only minor atherosclerosis, with 30%–40% narrowing of the left anterior descending artery and minimal irregularities in the other vessels. Left ventricular angiography is reported as showing an ejection fraction of 40%, with distal anterior and apical dyskinesis.

The patient makes an uneventful recovery from a cardiac perspective.

There are a number of features in this case that, in retrospect, suggest takotsubo cardiomyopathy (also known as broken-heart syndrome, apical ballooning syndrome and stress cardiomyopathy).

These include the following:

- history of overwhelming emotional and physical stress in an elderly woman (a 9:1 female:male ratio has been reported)^{1,2}
- chest pain
- new ECG changes (in this case,

T-wave inversion, although ST-segment elevation is also a common finding)

- moderate rise in troponin level
- dyskinesis of the left ventricle involving the anterior and apical segments ("takotsubo" refers to the shape of a basket used to catch octopuses in Japan, mimicked by the left ventricular angiogram in typical cases, although variants occur)
- absence of significant coronary artery stenosis
- resolution with conservative management and supportive care

Takotsubo cardiomyopathy has a reported prevalence of 2% of presentations of acute coronary syndrome. A surge in catecholamines as a result of massive stress, with resulting cardiotoxicity and microvascular spasm, is thought to be the mechanism. Additional catecholamine release due to cold exposure may account for the slightly higher reported incidence in winter. The condition was first described in Japan in 1990.³

Attempts have been made to distinguish the typical ECG findings of takotsubo cardiomyopathy from those of acute MI. In both cases, the findings may include ST elevation or T-wave inversion, and a lengthened QT interval. It is reported that in takotsubo cardiomyopathy precordial leads V4 through V6 are most commonly involved, that the degree of ST elevation is less, that reciprocal ST-segment depression changes are less evident and that pathological Q waves are less frequent.⁴ Diffuse changes, as seen in this case, not confined to any particular anatomic territory, may also be likelier in takotsubo cardiomyopathy.

From the perspective of a physician in a rural or remote emergency department, however, none of these criteria are specific enough to justify different initial management. In a case such as this, with a history of overwhelming stress precipitating chest pain, takotsubo cardiomyopathy can thus be suspected, but not diagnosed, and standard management according to protocols of ST elevation MI or non-ST elevation MI is indicated. This uncertainty requires an acceptance by the treating physician that a proportion of patients will receive unnecessary thrombolysis, but that the benefits of thrombolysis still outweigh the risks.

In this case, although many of the hallmark features of takotsubo cardiomyopathy are present, the retrospective diagnosis could be made with greater confidence if an echocardiogram report showing apical ballooning were available.

The precipitating stressful event may not always be evident. In cases of chest pain in the rural emer-

gency department, it is therefore prudent to inquire about possible overwhelming stressors and to offer as much emotional support as possible.

REFERENCES

1. Reeder GS, Prasad A. *Clinical manifestations and diagnosis of stress (takotsubo) cardiomyopathy*. Waltham (MA): UpToDate; 2015.
2. Tomich EB. *Takotsubo cardiomyopathy*. New York: Medscape; 2015. Available: <http://emedicine.medscape.com/article/1513631-overview#a6> (accessed 2016 Feb. 26).
3. Sato H, Tateishi H, Uchida T, et al. [Takotsubo type cardiomyopathy due to multivessel spasm] [article in Japanese]. In: Kodama K, Haze K, Hon M, editors. [Clinical aspect of myocardial injury: from ischemia to heart failure.] Tokyo: Kagaku Hyoronsha; 1990: 56–64.
4. Syed AS, Khalid U. Takotsubo cardiomyopathy vs acute myocardial infarction: diagnostic utility of subtle ECG differences. *Int J Emerg Med* 2011;4:17.

For the question, see page 53.

Competing interests: None declared.

Advancing Rural Family Medicine

Advancing Rural Family Medicine: The Canadian Collaborative Taskforce, a joint initiative between The College of Family Physicians of Canada and the Society of Rural Physicians of Canada, is pleased to release *Review of Family Medicine Within Rural and Remote Canada: Education, Practice and Policy*.

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Faire avancer la médecine familiale rurale

Faire avancer la médecine familiale rurale : Groupe de travail collaboratif canadien, une initiative conjointe entre Le Collège des médecins de famille du Canada et la Société de la médecine rurale du Canada, est heureux de publier *Revue de la médecine familiale dans les régions rurales et éloignées du Canada : éducation, pratique et politiques*.

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Seeds of hope

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She's 76 years old, and she's walked for 3 days over the foothills of the Himalayas to get to this tiny cubicle where I sit with my Nepali clinical clerk. She's tiny, maybe 35 kg, and her face is deeply marked. She's wearing the traditional red shirt and skirt of the area with a long piece of cloth wrapped around her waist several times. She's speaking in short sentences, recovering from the breathlessness resulting from the short walk from the benches outside into the hospital clinic. Her home is only 8 hours away, her niece tells the clerk, but it took them this long to walk because her aunt is having trouble breathing and they had to keep stopping.

We are in Amppipal, Nepal, a rural hospital surrounded by mountains and rice paddies. I am a Canadian rural physician teaching Nepali clinical clerks on their rural rotations. This is a volunteer position with a group from the Society of Rural Physicians of Canada and Academics Without Borders. It's my second day here. My clerk, a striking

24-year-old named Roja, takes a history, and another clerk, Nancy, translates for me. Roja rapid-fires questions at the tiny old lady. Nancy tells me that the patient has no burning micturition, and her menopause was 25 years ago. She denies headaches, and her movements have been normal. No blood, no vomiting, no paresthesias. My thoughts start drifting as I watch a contingent of ants dragging the dried corpse of a moth up the wall to some unknown destination in the corner of the room. It's a very detailed history. Roja seems to be trying to impress me with her thoroughness, but the old lady seems happy to be finally telling someone her story ... her whole story.

Then the story turns to her life. She had 3 children, 1 has survived and he is 48 years old and living in Oman, sending money home when he can. She lives with her daughter-in-law, her niece, her sister and her 2 grandsons. Since the earthquake destroyed her son's house last April, they have all lived in a temporary small clay shack. They are not ready to rebuild yet. The political troubles in the Terai, or plains region, have resulted in a fuel shortage because no fuel is getting in from India. They've been cooking with wood and dung on a clay stove inside for a few weeks, and since then my patient's breathing has been getting worse. There's been no word or money from her son for a few months. She's been diagnosed with chronic obstructive pulmonary disease for a few years and takes oral salbutamol 3 times a day.

I ask her through Roja if she'd be willing to stay in the hospital. At first she insists she's going home, but her niece intercedes. Once our patient is in a bed on the women's ward, it's apparent she's not doing well. The walk downstairs from the clinic has made her cyanotic. Her oxygen saturation is



The view over the valley from Amppipal Hospital toward the Annapurna mountain range.

reading in the high 60s. She waves off the offered oxygen — she doesn't have money to pay for this. We put the nasal cannula on anyway — the hospital will pick up the bill if she's too poor to pay.

This is but one patient. The hospital is filling up with them. These are the overlooked victims of Nepal's chronic crisis. The earthquake in April 2015 destroyed homes and lives, roads, schools and hospitals, and took away the tiny measure of security the people in the Gorkha region had. The government has been slow to pay to rebuild homes and donor money is tied up in bureaucracy, so people have managed as best they could — living crowded and frugal lives, rebuilding when they could afford it, not to code, and not up to withstanding the next earthquake.

In September, after a decade of deliberation, a new constitution was promulgated. It's not perfect, but it's Nepali. There was rejoicing, 2 days of statutory holidays, singing, fireworks. Then the troubles in the Terai erupted. The Madhesi people felt that their political rights were not enshrined. The Indian government was not pleased with the secular constitution. A blockade of the border stopped goods (fuel, food, clothes, etc.) from coming in from India.

Nepal is a landlocked country. It is nestled in the Himalayas between India and China. China, to the north, is accessible by mountain roads only, and these roads were largely obliterated by the earthquake. India, to the south, shares a flat border, and is virtually Nepal's only trading partner. Without fuel from India, Nepali people have no fuel for transportation, for heating their homes, for cooking food, for delivering medicine, for running x-ray machines or refrigerators. They have no power to pump or process water. They are hardy, and capable, and so have built clay ovens in their homes and are cooking and heating with wood and dung for fuel.

My patient recovered and started the walk home 5 days later. She had a quick smile on her face, an infectious laugh and a new spring in her step. She had been given antibiotics, steroids and bronchodilators. Two weeks later, however, as I was leaving the hospital, we were out of salbutamol. We were running out of antibiotics and steroids. Oxygen was still available, as long as the power was on, but power outages were more frequent as the cold season was coming on, and the back-up generators had only a few hours of fuel left. The hospital was entitled to 10 L of fuel, but this would have to be picked up in Dumre, a village down the jeep track, and the jeep would use up about that much fuel to do the round trip.

Nepal has been here before. This is not the first border blockade or political upheaval. This is not



Suvetchya, Roja, Nancy and Jasmin climb over the rubble still lingering from the earthquake, making their way from the canteen back to the hospital after tea.

the first earthquake. People adapt quickly, because memories of the last crisis are still current.

As I sit here tonight in my home in Midland, 3 weeks after returning, I think of my 7 students up in the hills by Amppipal. After their Dashain holiday, they all returned to their rural clerkship rotation. They are spending 4 months at the hospital, learning rural medicine and experiencing rural life. Roja wants to focus her sharp and questioning mind on public health. Daja wants to work with the elderly. Jasmin told me she felt it was a privilege to live and work in that breathtakingly beautiful place with those hardy, strong people. Shweta is from the Terai, and her compassion and even-handed approach to the crisis expressed a maturity far beyond her years. Nancy's winning personality will someday make her a leader in health policy. Suvetchya, I can see as a surgeon, bursting with ideas for quality improvement in rural care. Monisma, the gunner, will no doubt do brilliant things in the future; she will be a force for health improvement in Nepal, and always look perfect doing it. For now, these young women were my students and friends. More important, however, they are an inspiration to me and fill me with hope and optimism for the future of Nepal.

Competing interests: None declared.

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