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VOLUME 19, NO. 1, WINTER 2014

VOLUME 19, N° 1, HIVER 2014

IN THIS ISSUE

DANS CE NUMÉRO

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FEV_1: forced expiratory volume in 1 second; LS: least square; TDI: transition dyspnea index.

† B2355: A 12-week, multicentre, randomized, double-blind, placebo-controlled, parallel-group study assessing the safety and efficacy of ONBREZ* BREEZHALER* 75 mcg once daily vs. placebo in patients with COPD (n=318).

‡ From a subset of 239 patients in B2355. FEV, data shown is ONBREZ* BREEZHALER* vs. placebo, respectively: **5 min:** 1.56 vs. 1.39; **30 min:** 1.57 vs. 1.38; **1 hr:** 1.56 vs. 1.38; **2 hrs:** 1.56 vs. 1.37; **4 hrs:** 1.51 vs. 1.35; **6 hrs:** 1.48 vs. 1.33; **12 hrs:** 1.43 vs. 1.29; **16 hrs:** 1.39 vs. 1.24; **22 hrs:** 1.44 vs. 1.27; **24 hrs:** 1.48 vs. 1.34.

§ B2354: A 12-week, multicentre, randomized, double-blind, placebo-controlled, parallel-group study assessing the safety and efficacy of ONBREZ* BREEZHALER* 75 mcg once daily vs. placebo in patients with COPD (n=323).

¶ Comparative clinical significance has not been established.

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References: 1. ONBREZ* BREEZHALER* Product Monograph. Novartis Pharmaceuticals Canada Inc., October 24, 2012. **2.** Data on file. Novartis Pharmaceuticals Canada Inc. Study B2355. **3.** Data on file. Novartis Pharmaceuticals Canada Inc. Study B2354.

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Clothing the emperor: rural training challenges and opportunities

Peter Hutten-Czapski, MD
Scientific editor, CJRM
Haileybury, Ont.

Correspondence to:
Peter Hutten-Czapski;
phc@srpc.ca

There is a new fashion in town for training in family medicine. It's just a bit drafty right now for the real world of rural practice.

Oh yes, the Triple C Competency-based Curriculum sounds good. "Comprehensive." I have no idea how to measure that, and neither does The College of Family Physicians of Canada. "Focused on continuity of education and patient care." Can we really teach continuity? Please don't think it's taught and measured by putting in half a day a week at an academic clinic. "Centred in family medicine." Yeah, go measure that too.

If the concept is too diffuse to objectively define, measure or evaluate, how do we know when we have succeeded?

To this cynical scribe, the only concept worthy of the ink is the competency-based curriculum. This is exactly what rural generalist doctors have been requesting.

In practice, what Triple C has meant so far is dropping mandatory rural rotations and downloading responsibility from the university to the rural preceptor to sign off on competency. Whereas the first bit really does raise the hairs (what were they thinking?), the second bit shouldn't.

We rural medical generalists, of all people, have always worked shoulder-to-shoulder with other doctors. It's how we ourselves learned many new techniques that were not taught in residency. We know which learners need to be shown, which could do with us leaning over the table and which could work on their own with us sleeping by the phone. Signing off on competency just formalizes this training, and the question of competency is much more relevant than the questions involved in the previous fashion of evaluations.

The real question is, what is the competency being evaluated? That is the crux that needs to be pursued, and whereas the college can provide the framework, it's rural doctors who need to define our rural curriculum and convince residency programs to enact it.

Are residents competent in the diagnosis, investigation and management of more complex, chronic and advanced conditions that would normally be referred to a specialist in an urban setting? Are they capable of working at the primary, secondary and tertiary care level for complex conditions in consultation with regional specialists, based on community needs and geographic locations? Do they know when to refer? Are they competent working within a multidisciplinary and cross-cultural team, in which other team members also work in an advanced and extended role, often with different values and priorities? Can they handle common farm injuries, hypothermia, burns, fractures, attempted suicide, drowning, car crashes, and wilderness and disaster medicine?

And yes, can they attend low-risk and developing high-risk deliveries without local obstetric and pediatric support?

The fact that we can offer this training in rural areas has often been despite the training we ourselves have received. In the future, it should be because of the training we have received. Let's clothe the emperor with a rural curriculum. Ask your local residency program for it, and accept no substitutes.

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Habiller l'empereur : défis et possibilités en formation rurale

Peter Hutten-Czapski, MD
Rédacteur scientifique, JCMR
Haileybury (Ont.)

Correspondance :
Peter Hutten-Czapski;
phc@srpc.ca

Il y a une nouvelle mode en ville pour former les médecins de famille, mais elle n'empêche pas quelques courants d'air dans le monde réel de la pratique en milieu rural.

Ah oui, le cursus Triple C axé sur le développement des compétences me paraît une bonne chose. « Vise des soins complets et globaux »… Je n'ai aucune idée de la façon de mesurer cela et le Collège des médecins de famille du Canada non plus d'ailleurs. « Est orienté vers la continuité pédagogique et des soins aux patients »… peut-on vraiment enseigner la continuité ? Je vous en prie, ne pensez pas que c'est enseigné et mesuré en passant une demi-journée par semaine dans une clinique universitaire. « Est centré sur la médecine familiale »… ouais, allez donc mesurer ça aussi.

Dans la pratique, ce que le cursus Triple C a signifié jusqu'à maintenant, c'est l'abandon des stages obligatoires en milieu rural et le transfert de la responsabilité de l'université au précepteur rural pour attester des compétences. Alors que le premier élément fait dresser les cheveux sur la tête (à quoi pouvaient-ils bien penser ?), le deuxième ne devrait pas.

Nous, généralistes en milieu rural, plus que quiconque, avons toujours travaillé au coude à coude avec d'autres médecins. C'est ainsi que nous avons appris de nombreuses nouvelles techniques qui ne nous avaient pas été enseignées en résidence. Nous savons qui a besoin d'une démonstration, qui a besoin d'être supervisé de près et qui peut travailler seul pendant que nous nous assoupissons auprès du téléphone. Attester d'une compétence officialise simplement cette formation, et la question de compétence est beaucoup plus pertinente que ne l'étaient les questions des évaluations de l'ancienne mode.

La vraie question est la suivante : quelle compétence est évaluée ? C'est là le point crucial à élucider. Que le Collège puisse fournir le cadre est une chose, mais ce sont les médecins en milieu rural qui doivent définir notre programme d'études rural et convaincre les responsables des programmes de résidence de l'adopter.

Les résidents ont-ils les compétences nécessaires pour le diagnostic, les examens et la prise en charge de troubles plus complexes, chroniques et avancés qui devraient normalement être référés à un spécialiste en milieu urbain ? Sont-ils capables de traiter des pathologies complexes au niveau des soins primaires, secondaires et tertiaires en consultation avec des spécialistes régionaux et en fonction des besoins de la collectivité et des emplacements géographiques ? Savent-ils quand référer un patient à un spécialiste ? Ont-ils les compétences nécessaires pour travailler au sein d'une équipe pluridisciplinaire et interculturelle, dans laquelle d'autres membres de l'équipe ayant souvent des valeurs et des priorités différentes assument aussi un rôle de pointe et élargi ? Peuvent-ils traiter les blessures courantes en milieu agricole, l'hypothermie, les brûlures, les fractures, les tentatives de suicide, les noyades ou quasi-noyades et les accidents de voiture ? Et connaissent-ils bien la médecine en milieu éloigné sauvage et la médecine en cas de catastrophe ?

C'est souvent en dépit de la formation que nous avons nous-mêmes reçue que nous sommes en mesure d'offrir cette formation en milieu rural. À l'avenir, elle devrait plutôt être offerte à cause de la formation que nous avons reçue. Habillons l'empereur d'un programme d'études rural. Demandez-le aux responsables de votre programme local de résidence et n'acceptez aucun succédané.

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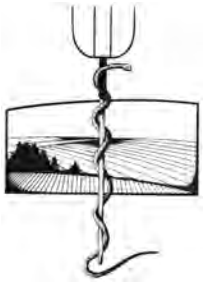

President's message.
*Per aspera ad astra**

See related news article on page 34.

Braam de Klerk, CM, MB ChB
Inuvik, NT

Correspondence to:
Braam de Klerk;
polardoc@gmail.com

For a long time, developing a rural curriculum in Canada was a pipe dream — aiming for the stars. Recently, after years of hard work on many levels and by many people, The College of Family Physicians of Canada (CFPC) has reached out to us with an invitation to create a Collaborative Committee on Rural Education. This committee will consist of an equal number of SRPC and CFPC members. The intent is that the work of this committee will eventually lead to a rural curriculum, incorporating the Triple C Competency-based Curriculum. We expect that some of the ideas and principles of the Cairns Consensus (see page 34) will be incorporated in this curriculum. This will be a great opportunity but also a major undertaking for the SRPC and will not be easy nor happen overnight. It will involve the challenge of extra expenditure for the SRPC.

The Australian College of Rural and Remote Medicine has made its curriculum available to us (now in its fourth iteration). Rural Australia is already seeing the benefits of this curriculum, the generalist mandate of some of their universities and the "branding" of their graduates as rural medical generalists. These doctors are well trained and well supported by their secondary and tertiary centres (through government and university mandates). They also feel confident in their abilities and enjoy their work, and the hope is that burnout will be less.

The Collaborative Committee on Rural Education should have a clear mandate, deliverable goals and a timeline. Finding the right future relationship between the SRPC and CFPC is of the utmost importance. There are many other considerations that will require decisions, such as rural input for mainstream training in family medicine, standards for rural faculty support, standards for rural training, accreditation and rural continuing medical education. The SRPC is lucky to have among its members academics and teachers who have been thinking about these issues for a long time, and their input will be invaluable.

This is an enormous challenge for the SRPC that has been inevitable in its evolution. If the SRPC is to play a more active role in the health of rural Canadians and the well-being of rural doctors, we will have to share in the responsibility of the development of the curriculum for, and the training of, rural residents and students. This will not be easy and will require strong cooperation from the membership and leadership of the SRPC, as well as from the CFPC and the universities. For historical reasons, not everybody will agree with this course of action, but most of those involved in the discussions and the council of the SRPC feel that this is an opportunity to grab with both hands and that we need to do this well.

To quote Karl Stobbe, Regional Assistant Dean, McMaster University, "We have an opportunity to redefine our role in rural education. Let's do it right!"†

*To the stars through difficulties.

†Personal communication in an email to the author.

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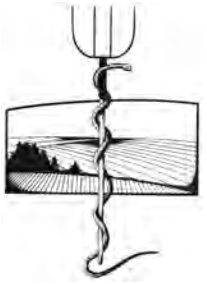

Message du président.
*Per aspera ad astra**

Voir l'article connexe à la page 34.

Braam de Klerk, CM, MB ChB
Inuvik (Nunavut)

Correspondance : Braam de Klerk; polardoc@gmail.com

Pendant longtemps, l'élaboration d'un programme d'études rural au Canada n'a été qu'un rêve — aussi bien viser la lune. Récemment, après des années de travail acharné de la part de nombreuses personnes et sur plusieurs fronts, le Collège des médecins de famille du Canada (CMFC) nous a tendu la main et invités à créer un comité de collaboration en matière de formation rurale. Ce comité, qui sera composé d'un nombre égal de membres de la SMRC et du CMFC, aura pour but ultime de créer un programme rural intégrant le programme Triple C axé sur le développement des compétences. Nous nous attendons à ce que des idées et des principes du Consensus de Cairns (voir page 34) soient intégrés à ce programme. Ce sera une occasion sans pareil, mais aussi une entreprise majeure pour la SMRC : le travail ne sera pas facile et ne s'accomplira pas du jour au lendemain. Il s'y ajoutera le défi de dépenses supplémentaires pour la SMRC.

L'Australian College of Rural and Remote Medicine (ACRRM) nous a donné accès à son programme (qui en est à sa quatrième édition). L'Australie rurale en perçoit déjà les avantages, à savoir le mandat généraliste de certaines universités et la « désignation » de leurs diplômés comme généralistes ruraux. Ces médecins sont bien formés et reçoivent un excellent soutien de leurs centres secondaires et tertiaires (par la voie de mandats gouvernementaux et universitaires). Ils estiment avoir les capacités requises et aiment leur travail. On espère ainsi réduire le taux d'épuisement professionnel.

Le comité de collaboration en matière de formation rurale doit être doté d'un mandat clair, d'objectifs réalisables et d'un calendrier. Il est également de la plus haute importance de définir la relation qui conviendra à l'avenir entre la SMRC et le CMFC. Par ailleurs, il faudra prendre des décisions au sujet de bien d'autres considérations, notamment la rétroaction rurale pour la formation « classique » en médecine familiale, les normes de soutien des enseignants en milieu rural, les normes de formation en milieu rural, l'accréditation et la formation médicale continue en milieu rural. Or, la SMRC la chance de compter parmi ses membres des universitaires et des enseignants qui réfléchissent à ces questions depuis longtemps; leur contribution sera précieuse.

C'est un énorme défi pour la SMRC, défi qui était inévitable dans son évolution. Si la SMRC compte jouer un rôle plus actif en milieu rural pour la santé des Canadiens et le bien-être des médecins, nous devrons partager la responsabilité de l'élaboration du programme et de la formation des résidents et des étudiants en milieu rural. Ce ne sera pas facile. Il faudra que les membres et la direction de la SMRC, ainsi que le CMFC et les universités collaborent étroitement. Pour des raisons historiques, certains ne seront pas d'accord avec ce plan d'action, mais la plupart des personnes qui participent aux discussions ainsi que le Conseil de la SMRC sont d'avis que c'est une occasion à saisir à pleines mains et que nous devons bien faire les choses.

Pour citer Karl Stobbe, doyen adjoint régional de l'Université McMaster, « Nous avons l'occasion de redéfinir notre rôle dans la formation rurale. Faisons-le correctement ! »†

*Par des sentiers ardus jusqu'aux étoiles.

†Communication personnelle dans un courriel à l'auteur.

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Use of the "crash room" in a rural hospital: case review of 100 cases

Jeanne Sansfaçon,
Université Laval, Québec, Que.

Gordon Brock, MD, FCFP, FRRMS
Vydas Gurekas, MD CM, CCFP, FRRMS*
Centre de santé et de services sociaux du Témiscamingue-et-de-Kipawa, Témiscaming, Que.

Correspondence to:
Gordon Brock;
geebee1951@hotmail.com

This article has been peer reviewed.

**Deceased July 17, 2013.*

Introduction: There is little published literature about the characteristics of patients with high triage levels seen in the emergency departments of rural hospitals. We sought to determine the demographics of patients brought into the "crash room" of a rural hospital, to assess the pathologies that brought them to the hospital and to study their final disposition.
Methods: We conducted a retrospective chart review of visits to the crash room of our rural hospital. We used the hospital's crash room register to compile a list of the last 100 consecutive visits to the crash room as of July 20, 2011. We extracted initial data from the register and additional data by chart review.
Results: Patients with triage levels 1 to 3 were brought to the crash room at a rate of 0.36 cases/wk/1000 population. Although circulatory disease, respiratory disease and "chest pain" accounted for 44.6% of final diagnoses, a wide range of pathology was seen in the crash room. Trauma and poisonings, and mental disorders accounted for 21.0% and 9.0% of diagnoses, respectively. The final diagnosis was nonspecific, vague or "unknown" in 20% of the visits. Of the crash room cases, 17% required transfer to a secondary care hospital.
Conclusion: Crash room visits in this rural hospital occurred at a rate of 0.48 cases/wk/1000 population. Most patients seen in the crash room were not given the traditional triage levels 1 or 2 that are usually associated with crash room care. The final diagnosis was nonspecific in 17.0% of cases, and mental disorders accounted for 9.0% of crash room visits.

Introduction : Peu de choses ont été publiées sur les caractéristiques des patients de niveaux de triage élevés qui sont vus à l'urgence dans les hôpitaux ruraux. Nous avons voulu analyser les caractéristiques démographiques des patients admis à la « salle de choc » de l'urgence d'un hôpital rural pour évaluer les pathologies les y ayant conduits et pour déterminer l'issue de la consultation.
Méthodes : Nous avons procédé à une analyse rétrospective des dossiers des patients conduits à la salle de choc de l'urgence de notre hôpital rural. Nous avons utilisé le registre de la salle pour compiler les dernières 100 visites consécutives précédant la date du 20 juillet 2011. Nous avons extrait les données initiales à partir de ce registre et des données additionnelles provenant de l'examen des dossiers.
Résultats : Les patients des niveaux de triage 1 à 3 ont été amenés à la salle de choc à raison de 0,36 cas/semaine/1000 habitants. Même si les cardiopathies, les maladies respiratoires et les « douleurs à la poitrine » ont compté, en bout de ligne, pour 44,6 % des diagnostics, les patients vus à la salle de choc ont présenté un grand éventail de pathologies. Les traumatismes, les empoisonnements et les problèmes de santé mentale ont représenté respectivement 21,0 % et 9,0 % des diagnostics. Le diagnostic final s'est révélé non spécifique, vague ou « inconnu » pour 20 % de ces 100 consultations à l'urgence. Parmi les patients vus à la salle de choc, 17 % ont nécessité un transfert vers un hôpital de soins secondaires.
Conclusion : Les consultations à la salle de choc de cet hôpital rural sont survenues à raison de 0,48 cas/semaine/1000 habitants. La plupart des patients vus à la salle de choc n'ont pas été assignés à des niveaux de triage habituels, soit 1 ou 2, généralement associés aux soins prodigués en salle de choc. Le diagnostic final s'est révélé non spécifique dans 17,0 % des cas, et les problèmes de santé mentale ont représenté 9,0 % des consultations en salle de choc.

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INTRODUCTION

During the fiscal year 2009/10, the Canadian Institute for Health Information (CIHI) reported that 0.8 million (14%) of 5.8 million Canadian emergency department (ED) visits were triaged at Canadian Triage and Acuity Scale (CTAS) level 1 or 2.[1] This finding is similar to that of the Ontario Ministry of Health and Long-term Care, which reported that 13.5% of patients seen in Ontario EDs were triaged at CTAS level 1 or 2, and an additional 39.0% were triaged at level 3.[2] Information about the characteristics of patients with high triage levels seen in the EDs of rural hospitals is important in terms of skills, staffing and continuing medical education (CME) needs, yet there has been little systemic study of this subject.

We sought to determine the basic demographics of patients brought into the "crash room" of a rural hospital, to assess the pathologies that brought these patients to the hospital and to study the final disposition of patients seen in the crash room.

METHODS

The Centre de santé et de services sociaux du Témiscamingue-et-de-Kipawa is a rural hospital staffed by family physicians offering 24-hour ED service in Témiscaming, Que., a paper-milling town on the Quebec–Ontario border. It serves a catchment area of 5000 people.

The ED contains 3 treatment areas: a large 2-patient crash room with full monitoring and resuscitation equipment, 2 small rooms for ambulatory care, and 1 surgical room for lacerations and minor procedures. There is also a 6-patient unit for short-term care for patients being admitted to hospital. There is no specialty care or advanced imaging (i.e., emergency ultrasonography or computed tomography) available locally. A crash room register that lists times of admission and departure, as well as diagnosis and treatment details, is maintained for all patient visits.

We conducted this study under the assumption that the crash room visits would involve patients with the highest triage levels. Beginning on July 20, 2011, we reviewed the crash room register for the last 100 visits. We obtained initial data from the register and extracted further data by review of individual charts. We used the International Statistical Classification of Diseases and Related Health Problems, Ninth Revision, to classify diagnoses.

The Conseil des medecins et dentists gave ethical approval of this study.

RESULTS

We analyzed 100 crash room visits (involving 87 patients) over a 41-week period (Sept. 29, 2010, to July 20, 2011), which represented a crude rate of 0.48 crash room cases/wk/1000 population.

Basic patient characteristics are presented in Table 1. Seventy-seven patients were seen once, 7 patients were seen twice and 3 patients were seen 3 times. Of the visits, 21% involved patients who had no identified family physician. This is a high rate compared with that published in 2008 in a study by the Institut de la statistique du Québec, which stated that 12% of the rural population in Quebec did not have a family physician.[3]

Of the 100 visits to the crash room, 75 occurred during on-call hours (i.e., 34 at night and 41 on weekends) (Table 2), at a rate of about 1 patient arriving during on-call hours every 20 days per 1000 population. Only 43 (43%) of the cases were triaged on arrival as levels 1 or 2 (rate = 0.2 cases/wk/1000 population). However, 74% of the cases were triaged as levels 1, 2 or 3 (crude rate 0.36/wk/1000 population).

"Chief complaints," as recorded at triage, are presented in Table 3. Out of the 100 visits to the crash room, 79 patients listed 1 chief complaint, 19 listed 2 complaints and 2 listed 3 complaints, for a total of 123 chief complaints. Three chief complaints (i.e., chest pain, shortness of breath and loss of

Table 1. Patient characteristics in 100 crash room visits

Characteristic	No. of cases*
Age, yr	
0–19	11
20–39	17
40–59	22
60–79	34
> 80	16
Age, mean (median), yr	55.4 (59.5)
Sex	
Male	56
Female	44
Marital status	
Single	31
Married/common-law partner	44
Widowed	11
Divorced/separated	11
Unknown	3
Identified family physician	
Yes	79
No	21

*Unless stated otherwise.

consciousness) accounted for about 40% of the visits. Seven patients had fallen, 2 had been involved in a motor vehicle crash and 1 had been involved in a physical assault.

Final diagnoses at the time the patient left the crash room are shown in Table 4. Of the 100 cases, 75 were attributed to a single diagnosis, 22 were given 2 diagnoses, 2 were given 3 diagnoses and 1 was given 4 diagnoses, for a total of 129 individual diagnoses. Circulatory disease (23.2%), trauma and poisoning (21.0%), and respiratory disease (16.0%) constituted most cases. No single diagnosis accounted for more than 6.2% of cases (exacerbation of chronic obstructive pulmonary disease) and 38 of the 129 diagnoses were made only once.

Two deaths occurred in the crash room during the study period.

Table 2. Characteristics of 100 crash room visits

Characteristic	No. of cases*
Time of arrival	
Morning (9:30 am to 12:30 pm, Mon–Fri)	11
Afternoon (12:30 pm to 5:30 pm, Mon–Fri)	14
Night (5:30 pm to 9:30 am)	34
Weekend (5:30 pm Fri to 9:30 am Mon)	41
Mode of arrival	
Ambulance	60
Ambulatory	39
Unknown	1
Time spent in the crash room, min	
< 30	6
30–59	11
60–89	21
90–119	19
120–149	14
150–179	6
180–239	8
≥ 140	8
Unclear	7
Time spent in the crash room, mean (median), min	125 (111)
Final disposition	
Discharge from hospital	16
Transfer to another hospital	17
Admission locally	61
Transfer for imaging or consultation and accepted back	6
Direct admission, length of stay	55
1 d	35
2–7 d	17
1 wk–1 mo	5
> 1 mo	1
Unknown	3
Death	2
Departure without discharge or refusal of treatment	3
Transfer to another area in the emergency department for further examination	1
Triage level	
1: Resuscitation	17
2: Very urgent	26
3: Urgent	31
4: Less urgent	20
5: Nonurgent	1
Unknown or unclear	5

*Unless stated otherwise.

DISCUSSION

A wide variety of chief complaints were assessed in our crash room, and a total of 129 final diagnoses were made in 100 cases. The percentage of cases due to trauma and poisoning (21.0%), and respiratory disease (16.0%) may be compared with findings from the United States that 22.5% and 9.8% of all US visits to EDs in 2010 were for trauma and respiratory disease, respectively.[4] That 23% of our crash room diagnoses were of circulatory disease did not come as a surprise given the potential seriousness of this disease.

Table 3. "Chief complaints" listed by the patient in 100 crash room visits

Chief complaint, *n* = 123*	No. (%) of cases
Chest pain	22 (17.9)
Shortness of breath	16 (13.0)
Loss of consciousness	11 (8.9)
Weakness	6 (4.9)
Dizziness	7 (5.7)
Fall (elderly patient)	6 (4.9)
Seizure	5 (4.1)
Vomiting	4 (3.3)
Intoxication	3 (2.4)
Headache	3 (2.4)
Lower limb pain	3 (2.4)
Upper limb trauma	3 (2.4)
Cough	3 (2.4)
Abdominal pain	2 (1.7)
Back pain	2 (1.7)
Drowsiness	2 (1.7)
Palpitations	2 (1.7)
Confusion	2 (1.7)
General discomfort	2 (1.7)
Motor vehicle crash	2 (1.7)
Hypoglycemia	2 (1.7)
Miscellaneous†	16 (12.8)

*Some patients reported more than 1 chief complaint.
†One case each: nose bleed, vomiting of blood, hypothermia, suicidal thoughts, fall (not specified), heartburn, hemiplegia, foreign-body aspiration, physical assault, burn, heat exposure, labour contractions, fever, skin redness, right hand pain and wrist pain.

The finding that 75% of crash room visits occurred during on-call hours, coupled with the finding of a rate of 1 patient visit during on-call hours every 20 days per 1000 population, may help administrators address the requirements for on-call staffing and proximity of on-call physicians during these hours.

Interestingly, 11 of 129 (9.0%) of the final diagnoses were of mental disorders. This finding could be interpreted in light of the recommendations of the Rural Critical Care Course[5] to initially evaluate serious mental disorders in the crash room, or it could also reflect the fact that the initial presentation (e.g., palpitations) of disorders such as anxiety states may mimic that of potentially more serious disease. Our reported diversity of diagnoses might well be kept in mind by physicians and administrators planning for CME, nurse-training and equipment purchases.

Table 4. Final diagnoses in 100 crash room visits (part 1 of 2)

Diagnosis, *n* = 129	No. (%) of cases
Circulatory system	30 (23.2)
Syncope	5 (3.9)
Angina	5 (3.9)
Acute myocardial infarction	4 (3.1)
Atrial fibrillation	3 (2.3)
Congestive heart failure	3 (2.3)
Essential hypertension	2 (1.6)
Cardiac arrest	2 (1.6)
Miscellaneous*	6 (4.7)
Respiratory system	20 (16.0)
COPD exacerbation	8 (6.2)
Pneumonia	5 (3.9)
Malignant neoplasm of bronchus and lungs	2 (1.6)
Dyspnea and respiratory abnormalities	2 (1.6)
Miscellaneous†	3 (2.3)
Nervous system and sense organs	10 (8.0)
Convulsions	4 (3.1)
Febrile convulsions	3 (2.3)
Occlusion of cerebral artery	2 (1.6)
Miscellaneous (sciatica)	1 (0.8)
Trauma and poisoning	27 (21.0)
Head injury	4 (3.1)
Fracture of neck of femur	3 (2.3)
Heat stroke and sunstroke	2 (1.6)
Contusions	2 (1.6)
Poisoning by drugs, medicines and biologic substances	3 (2.3)
Miscellaneous‡	13 (10.1)
Mental disorders	11 (9.0)
Alcohol abuse	5 (3.9)
Anxiety states	4 (3.1)
Miscellaneous§	3 (2.3)

Continued

The low proportion of crash room cases triaged at levels 1 or 2 was surprising and may have been due to one or a combination of several reasons. First, the system of assigning a triage level may not correspond to the subjective visual assessment of the patient by staff. Second, patients given lower triage levels may be brought to the crash room because of the spacious nature of our crash room. Third, ambulance crews may routinely bring their patients to the crash room. Fourth, the present triage system may be inappropriate for use in rural hospitals. Finally, errors in triaging may occur. An Ontario report found that 44% of ED patients in 2008/9 were incorrectly triaged (38% were undertriaged and 6% were overtriaged) and that "visual patient presentation is an essential element of assigning a CTAS level."[2]

The final diagnosis was nonspecific, vague or unknown in 17 (17.0%) cases (syncope [5 cases], dyspnea and respiratory abnormalities [2 cases],

Table 4. Final diagnoses in 100 crash room visits (part 2 of 2)

Diagnosis, *n* = 129	No. (%) of cases
Toxic–metabolic	9 (7.0)
Drugs, medicines and biologic substances causing adverse effects in therapeutic use	4 (3.1)
Hypoglycemia	2 (1.6)
Miscellaneous¶	2 (1.6)
Digestive system	
Miscellaneous**	3 (2.3)
Infectious and parasitic	
Miscellaneous††	3 (2.3)
Obstetrics–gynecology	
Miscellaneous‡‡	2 (1.6)
Immune system	
Miscellaneous (anaphylactic shock)	1 (0.8)
Symptoms, signs and ill-defined conditions	10 (8.0)
Chest pain not otherwise specified	7 (5.4)
Malaise and fatigue	2 (1.6)
Miscellaneous (unknown)	1 (0.8)

COPD = chronic obstructive pulmonary disease.
*One case each: cardiac tamponade, sinus bradycardia, ventricular premature beats, palpitations, dizziness, hypotension.
†One case each: acute respiratory failure, ingestion of object causing obstruction of the respiratory tract. One diagnosis cannot be found.
‡One case each: burn of the face and hands, concussion, shoulder dislocation, extradural hemorrhage following injury, fall on same level, acute pain due to trauma, fracture of tibia, hypothermia, toxic effect of sulphur dioxide inhalation, fracture of dorsal or lumbar spinal column, necrotizing fasciitis, traumatic amputation of finger, upper back injury.
§One case each: suicide attempt, parent–child problems, senility without psychosis.
¶One case each: weight loss, osteoporosis.
**One case each: alcoholic cirrhosis of liver, esophageal reflux, gastrointestinal hemorrhage.
††One case each: sepsis, pyogenic arthritis, influenza.
‡‡One case each: ovarian cyst, early onset of labour.

chest pain [7 cases], malaise and fatigue [2 cases], and unknown [1 case]) compared with a rate of 21.6% for all ED visits in the US.[4] We do not consider this finding to be worrisome because inability at times to make a specific diagnosis is not inconsistent with the purpose of the crash room, which is to rapidly identify and stabilize life-threatening or critical illnesses, rather than to make definitive diagnoses.

Of the crash room cases, 61% resulted in admission locally to the short-term care unit, 17% resulted in transfer to another health care facility and 16% resulted in the patient being discharged home, as compared with 28%, 3% and 65%, respectively, of ED visits triaged at levels 1 or 2 reported by CIHI in 2009/10.[1] Additionally, the median length of stay in our crash room was shorter (111) minutes, than the 253 minutes (triage level 1) and 290 minutes (triage level 2) that was reported by CIHI.[1]

Our patients' short stays in the crash room compared with CIHI data might be explained by one or a combination of the following. First, as judged by the triage levels, it is likely that many of our patients were not seriously ill and their conditions were stabilized quickly, or our adjacent short-term care unit was used to continue the monitoring and care that might be given in the crash room of an urban hospital. With the crash room's capacity to accommodate only 1–2 patients, there may have been pressure to quickly transfer patients out. Second, it was predictable that a rural health care centre would have a higher transfer rate than the average Canadian hospital, because neither specialty care nor advanced medical imaging is usually available locally.

Limitations

There are several limitations to this type of retrospective study. First, the accuracy of the study depends completely on the quality of the crash room register record-keeping, and only data recorded in charts could be analyzed. It is possible that patients with triage levels 1 or 2 were taken to other areas in the ED (e.g., isolated lacerations are not routinely brought to the crash room), and assigned triage scores may not have been accurate. Further and larger studies of crash room visits, the characteristics of patients brought by ambulance, and the accuracy of triage and its use in the decision of where to put the patient may provide more data about how the care of patients with the highest triage level is managed.

CONCLUSION

In this chart review of crash room use in a rural hospital, we found that visits to the crash room occurred at a rate of 0.48 cases/wk/1000 population and that most patients seen in the crash room were not given the traditional triage levels usually associated with crash room care. A high proportion of visits occurred outside of regular working hours, with 1 patient arriving during on-call hours every 20 days per 1000 population. Only 43% of cases were initially triaged at levels 1 or 2. Circulatory disease was the diagnostic category that accounted for the largest proportion of visits. Mental disorders and nonspecific diagnoses accounted for 9.0% and 17.0% of final diagnoses, respectively.

Competing interests: None declared.

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Original Article
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Is there a relation between emergency department and inpatient lengths of stay?

Pria M.D. Nippak, PhD, MSc, HBSc, HBA
Winston W. Isaac, PhD, MPA, CHE
Candace J. Ikeda-Douglas, MSc, HBSc
School of Health Services Management, Ryerson University, Toronto, Ont.

Anne Marie Marion, BHA, CHIM
School of Health Services Management, Ryerson University, Toronto, Ont., and Ross Memorial Hospital, Lindsay, Ont.

Mike VandenBroek, MSW, RSW
Ross Memorial Hospital, Lindsay, Ont.

Correspondence to:
Pria Nippak,
pnippak@ryerson.ca

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Introduction: Emergency departments (EDs) are key entry points to hospital care, and issues of overcrowding and poor patient flow have become a priority in Canada. Studies have sought to determine factors that influence ED wait times in an effort to improve patient flow. We sought to identify the impact of factors such as patient age, triage level, comorbid factor level and sex to determine their effects on length of stay (LOS) and the role that they play in the ED and in an inpatient setting.
Methods: We analyzed 2 years of data from 2007 to 2009. We conducted a repeated-measures analysis of variance to measure the effects of age, triage level, comorbid level and sex as they relate to ED and inpatient LOS.
Results: Our analysis resulted in a final sample of 4743 patient visits. A longer LOS in the ED was correlated with a longer inpatient LOS. Age, comorbidity level and sex were shown to have an influence on LOS.
Conclusion: Continued efforts to further reduce ED LOS are crucial, because this has the potential to influence outcomes, efficiency of EDs and succession to inpatient status, which may affect costs to the health care system. Patient-specific factors need to be considered when formulating and refining policies and processes to improve patient flow.

Introduction : Le service d'urgence est la porte d'entrée des soins hospitaliers et les problèmes d'engorgement et de lenteur de roulement des patients deviennent une priorité au Canada. Des études ont tenté de déterminer quels facteurs influent sur les temps d'attente à l'urgence dans le but d'améliorer le roulement des patients. Nous avons donc voulu mesurer l'impact de différents facteurs, tels que l'âge des patient, la catégorie de triage, le niveau de comorbidités et le sexe, sur la durée des séjours et le rôle qu'ils jouent à l'urgence et dans les unités de soins.
Méthodes : Nous avons analysé 2 années de données, soit de 2007 à 2009. Nous avons procédé à une analyse de la variance par mesures répétées afin d'évaluer les effets de l'âge, de la catégorie de triage, du niveau de comorbidités et du sexe sur la durée des séjours à l'urgence et dans les unités de soins.
Résultats : Notre analyse nous a donné un échantillon final de 4743 consultations. Nous avons établi une corrélation entre un séjour plus long à l'urgence et un séjour plus long dans les unités de soins. L'âge, le niveau de comorbidités et le sexe ont exercé une influence sur la durée du séjour.
Conclusion : Il est indispensable de poursuivre les efforts pour abréger la durée des séjours à l'urgence, puisqu'elle influe sur les résultats au plan de la santé, sur l'efficience des services d'urgence et sur la transition vers l'hospitalisation, ce qui peut affecter les coûts pour le système de santé. Il faut tenir compte de facteurs spécifiques aux patients au moment de formuler et de parfaire les politiques et les procédés qui ont pour but d'améliorer le roulement des patients.

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INTRODUCTION

Overcrowding is a chronic condition that exists in emergency departments (EDs) worldwide, and Ontario is no exception.[1–4] Research has shown that the causes of ED overcrowding are often multifactorial in nature,[5–7] with lack of inpatient bed availability cited as one of the key issues.[2,3,5,8] Other studies have shown ED overcrowding can have a negative impact on resources, affect patient safety,[1,3,9–11] produce poor outcomes[6,12–14] and limit a hospital's capacity to respond to an external crisis or pandemic.[15]

The literature indicates that systemic factors such as ratios of nursing and physician staff play a role in impeding flow; however, community factors, patient demographics (e.g., age, triage level and diagnosis[10,16–18]) and hospital-specific factors (e.g., hospital size and location) also play contributory roles.[1,14,19–21]

Many hospital-specific factors have been shown to contribute to ED length of stay (LOS) and overcrowding,[14] such as inpatient LOS.[22] Several studies have shown that there is a specific relation between ED and inpatient LOS.[23–26] Richardson[23] demonstrated that admitted patients who spent longer than 8 hours in the ED had a mean inpatient LOS of 0.8 days longer than patients who did not experience delays in the ED. Li and colleagues[26] concluded that ED wait times under 8 hours were linked with the shortest overall stays. Similarly, Liew and coauthors[24] found a strong correlation between ED and inpatient LOS, independent of other variables.

Others have shown that this relation between ED and inpatient LOS creates a systemic bottleneck, which reduces the ED's ability to adequately manage the flow of patients who do not require admission.[25] Furthermore, studies have suggested that initiatives aimed at reducing ED LOS can influence outcomes beyond the ED, namely inpatient LOS.[8,19,23,27] Whereas these studies have shown a positive correlation between ED and inpatient LOS, there is a paucity of in-depth analysis to establish the factors that contribute to LOS within the ED and inpatient settings. Thus, an examination of patient flow through the ED supports the idea that several factors contribute to ED and inpatient LOS.

Addressing ED overcrowding, through an examination of ED LOS, has been a key health care priority in Ontario over the past few years. The Ontario Ministry of Health and Long-term Care has set a specific 8-hour target from time of triage to transfer to an inpatient unit for admission based on the Canadian Triage and Acuity Scale.[8] Although hospitals are currently moving toward achieving this target, some Ontario hospitals are still in excess of the 8-hour target time. Hospitals are now receiving incentives based on their ability to meet key targets for ED wait times set out by the ministry.[28] It is clear that the goal of improving wait times is linked to a better understanding of what the key contributing factors are and how they are interrelated. Given that there have been only a few Canadian studies and there is a diversity of hospital types and settings within Canada, it is essential that this be examined in a variety of contexts to establish the influence of hospital-specific factors.

The aims of this study were to identify the relation between ED and inpatient LOS at Ross Memorial Hospital, an acute care hospital located in Lindsay Ont., and to determine the influence of patient age, comorbid factor level and sex on the LOS within a rural hospital setting. The findings of this study may help to identify whether these patient factors significantly contribute to inpatient LOS, which may lead to suggestions to improve patient flow as a means of reducing inpatient LOS at a rural hospital. This could ultimately have an impact on cost and care outcomes.[23,24,27]

METHODS

Study design

This study took place at Ross Memorial Hospital; a 170-bed community hospital in Ontario. This was a quantitative retrospective descriptive analysis of adult patients admitted to acute care via the ED during the fiscal years 2007/08 and 2008/09.

The Canadian Triage Acuity Scale was used to determine acuity of illness as patients presented to the ED.[29] The scale ranges from 1 (most urgent conditions) to 5 (conditions may be acute but nonurgent).[29]

Sample

To measure LOS in the ED, we used time in hours from triage to transfer to an inpatient bed, the standardized definition of the Ontario Ministry of Health Long-term Care.[8] To define LOS in the inpatient setting, we used time in hours from transfer from the ED to discharge from hospital. To calculate ED and inpatient LOS, we extracted the time from transfer to an inpatient bed from the Discharge Abstract Database, which contains the date and time that patients left the ED.

Exclusion criteria were as follows: patients who were admitted but remained in the ED; patients who did not physically access an inpatient bed; patients who died in the ED or were transferred to

another facility; and patients who were admitted from the ED to the mental health unit, complex continuing care or rehabilitation.

Procedures

We extracted age, sex, triage level, comorbidity factor level, and ED and inpatient LOS from the MED2020 WinRecs software that populates the National Ambulatory Care Reporting System and the Discharge Abstract Database.[30] Extreme outliers were removed from inpatient LOS by filtering 2 standard deviations (SDs) from the mean. The sample was further stratified into 6 comorbid factor levels that have been defined by the Canadian Institute for Health Information (CIHI),[31] with level 5 representing diagnosis groups in which no comorbid factor level was applied.

Analysis

We analyzed data using Microsoft Office Excel 2003 and PASW Statistics SPSS version 20.

We used a Pearson correlation coefficient to analyze the relation between ED and inpatient LOS. We stratified ED LOS into 3 distinct groups: 1) < 9 hours (in line with ministry targets); 2) 9–24 hours; and 3) 24 hours from time of triage to transfer to an inpatient bed. We used one-way analysis of variance (ANOVA) with post hoc tests of least significant difference to determine inpatient LOS differences in the respective means for the 3 groups. We used repeated-measures ANOVA to test for main effects and interactions.

RESULTS

Demographics

From the initial sample of 4987 patient visits, 4.9% were excluded because of incomplete data needed to calculate either the ED or inpatient LOS. This resulted in a final sample of 4743 visits. There were a total of 84 808 visits to this rural ED during the study period. There were 8606 admissions to acute care, and of these, 7064 involved adult patients. Of the adult admissions to acute care, 70.6% originated from the ED. The mean age of patients was 69.6 (SD 17.0) years (Table 1).

Effect of ED LOS on overall LOS

The mean ED LOS was 23.03 hours and the mean inpatient LOS was 158.76 hours. There was a positive correlation between time spent in the ED and the corresponding inpatient LOS, which suggests that as the LOS in the ED increased, there was an associated increase in LOS in the inpatient setting ($r_{1, 4742} = 0.073$, $p < 0.001$). This translated into 774 bed-days per year for the group with an ED LOS of 9 to 24 hours, and 1234 bed-days per year for the group with an ED LOS of greater than 24 hours. Stratification of ED LOS into 3 different time frames and a post hoc analysis of least significant difference identified significant differences between each group of ED time frames and inpatient LOS ($F_{2, 4740} = 28.92$, $p < 0.001$) (Fig. 1). As well, results of the repeated-measures

Table 1. Characteristics of 4743 patient visits admitted to the emergency department

Characteristic	No. (%) of patients
Patient age, yr	
19–35	255 (5.4)
36–52	529 (11.2)
53–69	1172 (24.7)
70–86	2180 (46.0)
87–104	607 (12.8)
Comorbid factor level	
0	3590 (75.7)
1	701 (14.8)
2	252 (5.3)
3	158 (3.3)
4	25 (0.5)
5	17 (0.4)
CTAS level	
1	101 (2.1)
2	1410 (29.7)
3	2976 (62.7)
4	251 (5.3)
5	5 (0.1)

CTAS = Canadian Triage and Acuity Scale.

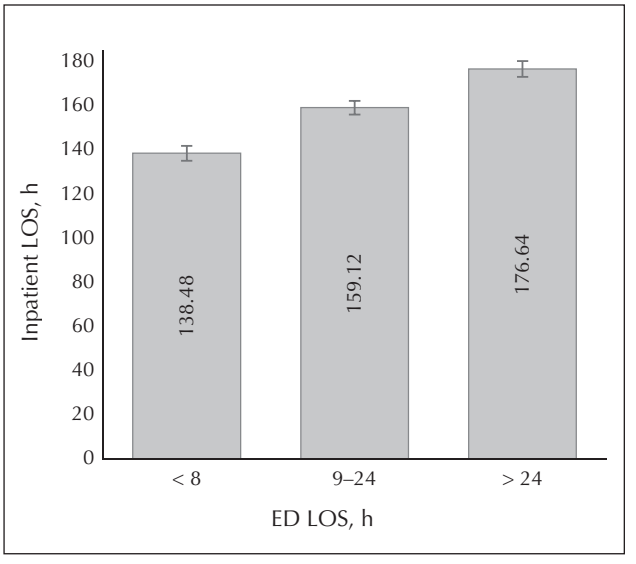

Fig. 1. Inpatient length of stay (LOS) by emergency department (ED) LOS.

ANOVA revealed that there was a main effect of LOS, indicating that the ED LOS was shorter (M = 19.62, standard error [SE] 0.86) than the inpatient LOS (M = 188.44, SE 6.09; F_1 = 185.06, p < 0.001).

Effects of age

Results of a repeated-measures ANOVA showed a main effect of age indicating that as age increased, so did the LOS (F_4 = 4.55, p = 0.001) (Fig. 2). A pairwise comparison showed the 2 older age groups (70–86 and 87–104 yr) had significantly longer stays than the 2 younger age groups (19–35 and 36–52 yr) (p < 0.001).

We found a significant interaction between age and LOS (F_4 = 3.43, p = 0.008). There was a within-group effect of age, with patients aged 19–35 years (M = 13.62, SE 2.61) having a shorter LOS than patients aged 87–104 years (M = 25.38, SE 1.92). Inpatient stays were shorter for the 19–35 age group (M = 103.07, SE 18.44) and longer for each of the older age groups (Fig. 3). Among patients

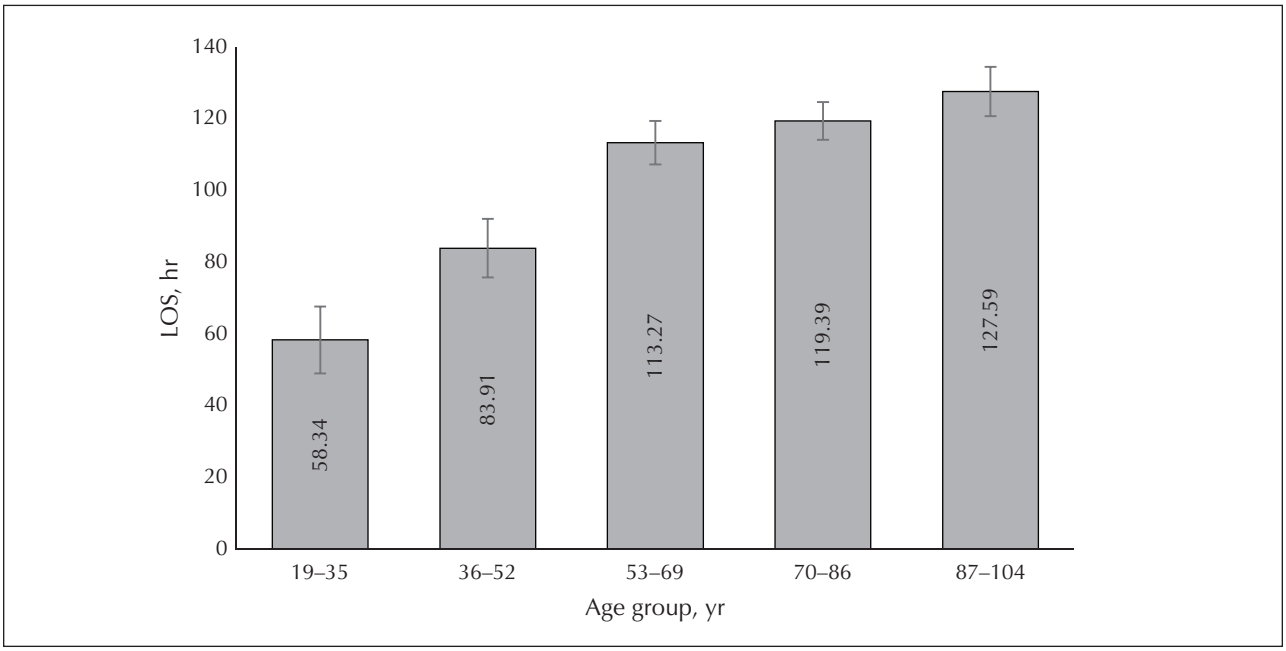

Fig. 2. Length of stay (LOS) in hospital, by age group.

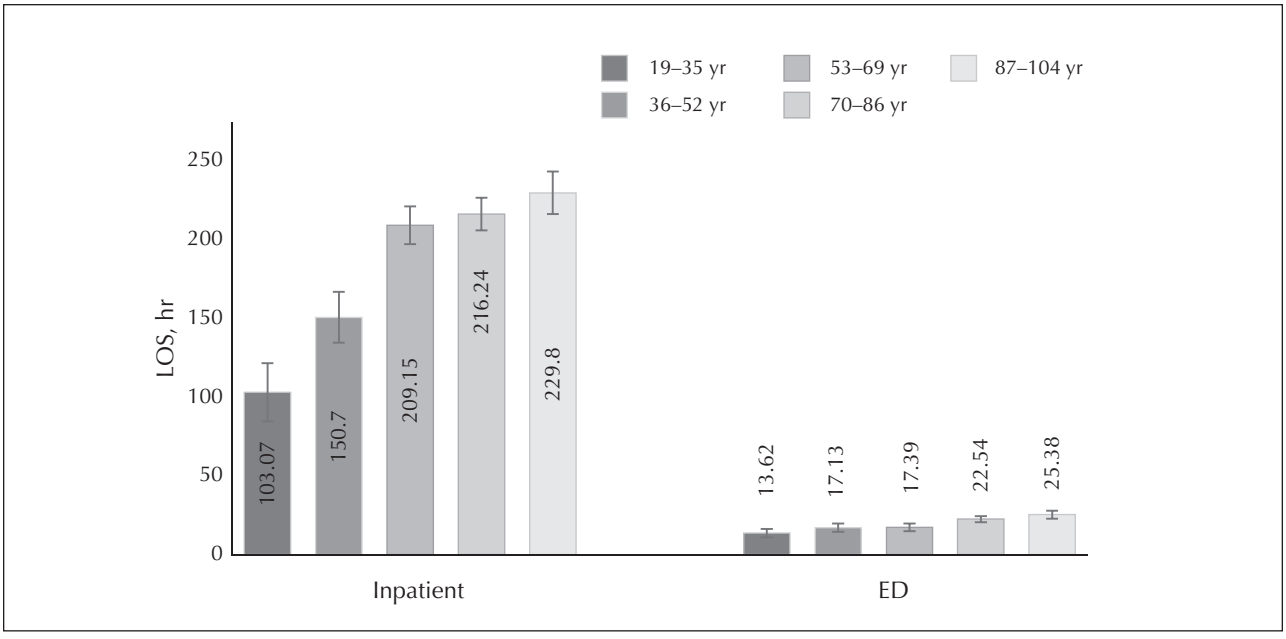

Fig. 3. Inpatient and emergency department (ED) length of stay (LOS), by age group.

older than 53, there were no significant differences between the age ranges, but they had the longest LOS.

Effects of comorbidity factor levels

There was a significant main effect of comorbid factor level on LOS, which showed a corresponding increase in LOS as the level of comorbidity increased from 0 to 4 (F_5 = 9.68, p < 0.001) (Fig. 4). A significant interaction between comorbid factor level and LOS (F_5 = 9.05, p < 0.001) indicated that the mean inpatient LOS for comorbid level 0 was the shortest and rose as the comorbid level increased (Fig. 5). Comorbidity level 4 showed a significantly increased inpatient LOS (p < 0.05).

We performed pairwise comparisons between different comorbid factor levels and found a significant difference between levels 3 and 0 (p < 0.001, p = 0.01) and between levels 4 and 1 (p < 0.001, p < 0.001). These results suggest that longer stays were associated with higher comorbidity factor levels. We found no other significant comparisons.

Effects of sex

There was a main effect of sex indicating that women had a shorter LOS at 93.54 hours than men

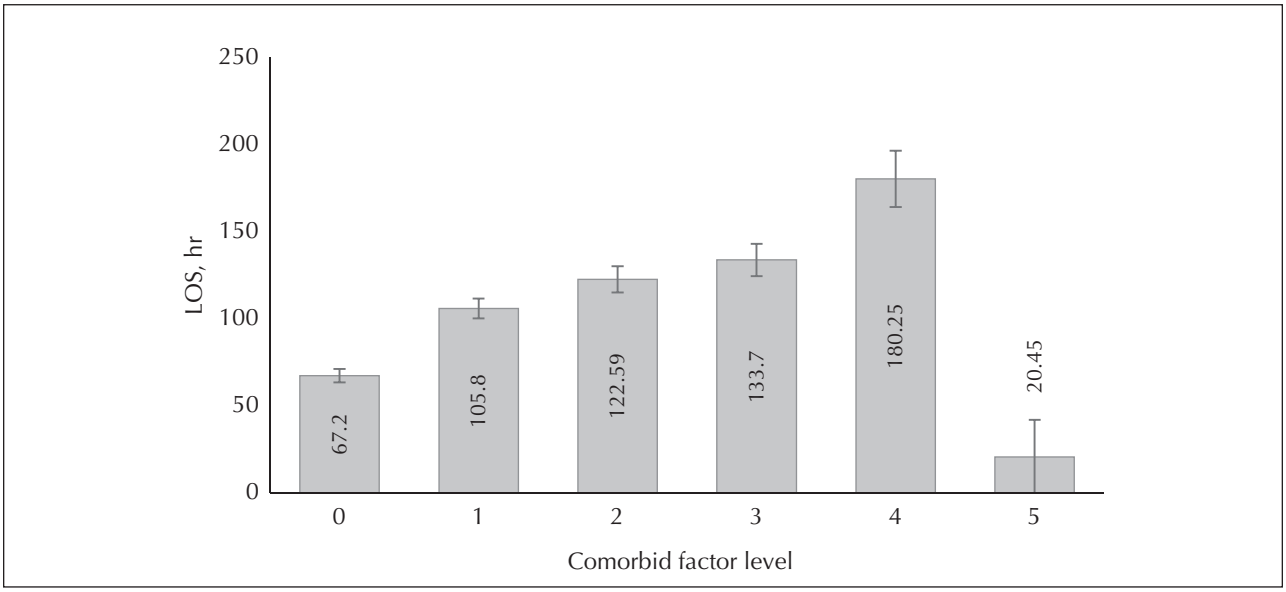

Fig. 4. Length of stay (LOS) in hospital, by comorbid factor level.

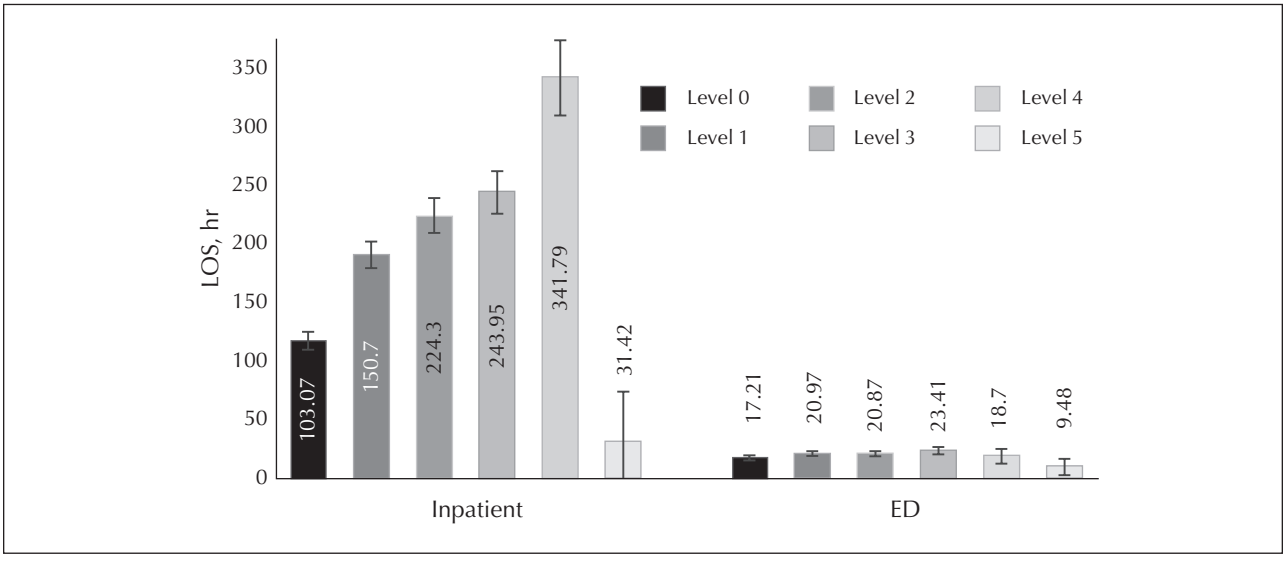

Fig. 5. Inpatient and emergency department (ED) length of stay (LOS), by comorbid factor level.

at 115.28 hours ($F_1 = 7.53$, $p = 0.006$). An interaction between sex and LOS suggested that men had longer stays ($F_1 = 6.42$, $p = 0.01$) (Fig. 6).

Effects of triage level

Triage level did not show a significant main effect on LOS, ($F_4 = 1.87$, $p = 0.1$). As expected, however, the shortest ED LOS was observed among patients with triage level 1 ($M = 9.04$, SE 2.56), with a longer ED LOS reported for each additional triage level. Triage level 3 ($M = 222.65$, SE 8.05) had the longest inpatient LOS in comparison to the other triage levels.

DISCUSSION

This study provided evidence of a potential relation between ED and inpatient LOS, with the findings indicating that a longer LOS in the ED was associated with a longer inpatient LOS. Further examination showed that comorbid factor level, age and sex also influenced LOS. Similar to previous findings, older patients experienced longer ED and inpatient stays than their younger counterparts.[25,28,32] Our findings suggested that although women and men spent a similar amount of time in the ED, women had shorter inpatient stays than their male counterparts.

The correlation analysis reinforces the need to deal with ED overcrowding and impaired patient flow with a system response.[2,9,33] This requires finding solutions to barriers at each departmental level to improve patient flow through the system.[33,34] Strategies on the inpatient side could include an integrated approach to discharge planning with more involvement of the Community Care Access Centre, improved capacity and operational planning, and increased collaboration with other outside community agencies.[8] Ruger and colleagues[35] suggested that initiatives need to target specific groups to improve patient flow, such as those with comorbidities, to reduce the strain on EDs. These could include prescribing medications and having appropriate follow-up to improve health outcomes.[7,17,24,34]

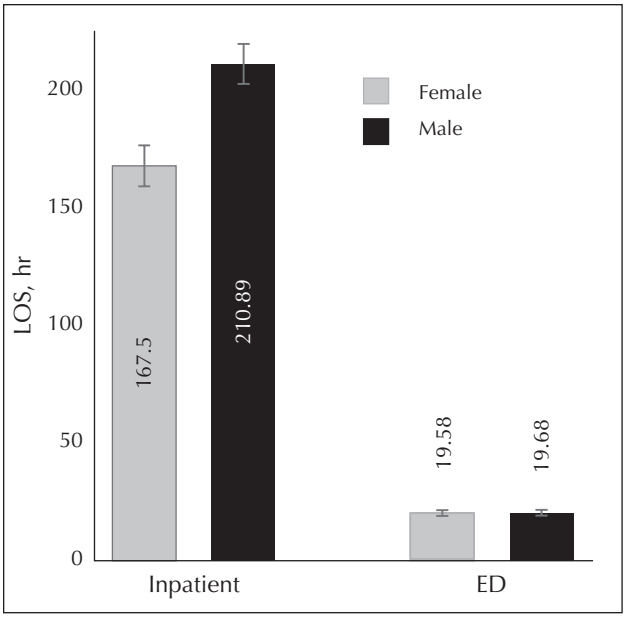

Fig. 6. Inpatient and emergency department (ED) length of stay (LOS), by patient sex.

The results of this study support continued efforts to reduce ED wait times for those patients admitted via the ED to improve outcomes, efficiency and cost.[9,36–38] Currently, provincial health care agencies have laid out a group of recommendations to address ED overcrowding and reach performance targets in terms of reducing time in the ED.[8] These recommendations have proven invaluable, because many Ontario hospitals are now reaching their performance targets; however, patient flow through the system is still a challenge. Improving the flow of admitted patients from emergency to inpatient wards could have a positive effect, freeing up valuable resources and expanding the hospital's capacity to deal with surges in activity.

Stratification of ED LOS into 3 distinct time frames allowed for analysis of the effect of incremental increases in ED LOS on inpatient LOS. The results showed that the group that spent 9–24 hours in the ED had a significantly longer inpatient LOS compared with the group that spent less than 9 hours in the ED. This excess in LOS equates to 774 bed-days per year, which has a great impact on hospital resources and costs.[8] Patients who spent more than 24 hours in the ED before accessing an inpatient bed also had significantly longer stays than the 8-hour group, equivalent to 1238 bed-days per year. This is similar to the findings of Liew and colleagues[24] and Bernstein and coauthors,[19] although different time groups were used to measure ED LOS. Whereas Huang and colleagues[27] also used different parameters for measuring ED LOS, they too found an effect of ED delay on inpatient LOS of about 1.2 days among patients experiencing delays of greater than 12 hours.

Age, comorbid factor level and sex were shown to influence LOS in this study, which indicates that ED LOS alone did not account for longer inpatient LOS. The study sample's mean age of 69.6 years is higher than in a report released by the CIHI in 2007, in which the mean age of patients admitted

via the ED was 56 years.[39] This demographic difference was perhaps due to the rural setting, because the largest (46%) age group serviced in this study was 70–86 years. Chen and Tescher[40] examined the demographic profile of a rural Australian hospital and noted similar rates of use by older individuals. In the current study, inpatient LOS increased with age, with a significant difference found within the first 3 age groups. However among patients older than 53 years, there were no significant differences between the age ranges, although they had the longest LOSs. These results are supported by Richardson,[23] and Liew and colleagues[24] who determined that "access blocked" patients tended to be in older age groups[23,24] and were at risk of exceeding the state average LOS for inpatients.[24] These findings suggest that strategies targeted at older patients could have a positive effect in a rural hospital. Potential improvements may include enhanced geriatric nursing care, better involvement from the local Community Care Access Centre and advanced home care nursing teams, and increased community-based programs targeted at supporting seniors.[8]

We chose comorbid factor level as a variable for analysis because it represents a measure of the impact of comorbidity or secondary conditions on resource use. This comorbidity variable was introduced by the CIHI in 2007 into their grouping methodology, and it appeared to be the strongest predictor on LOS.[32,39] Increased comorbidity was associated with increased LOS; however, the limited sample size for comorbid factor level 4 must be considered. The reported effect was largely from the inpatient side, which warrants further investigation given the potential impact on resource use. Several strategies to deal with comorbidity have been explored.[24, 27, 29,41] These strategies are largely focused on the development of sensitive screening techniques to ensure that comorbid conditions are appropriately identified to facilitate the concurrent treatment of conditions from the point of entry to the ED.

Patient sex also influenced LOS, with men staying in hospital 21.7 hours longer than women when ED and inpatient LOS were combined. With consideration of ED and inpatient LOS separately, it would appear that the effect of sex was far greater on the inpatient side, with men staying 43 hours longer than women. There was no sex difference in time spent in the ED. These findings differ from other studies that found women had longer inpatient stays.[32,42] One reason for this could be linked to the theory that men wait longer to seek help on health issues and as a result are sicker, thus requiring a longer inpatient stay than women. However, several studies have opposing results.[43,44] Given the lack of research on the influence of demographic factors in rural hospital settings, it is difficult to discern the role of geographic location on the effect of patient sex.

Limitations

We derived the data used for this study from a single rural community hospital, and the findings may not be representative of or generalizable to other settings or communities. This study showed an association and did not demonstrate any cause and effect relation.

Our operational definition of inpatient LOS was different than that of the CIHI.[45] The CIHI defines inpatient LOS as equal to the total number of hours a patient spent in acute care over the course of the day. We used an alternative definition to ensure that ED LOS was entirely excluded from the inpatient LOS. Another limitation was the calculation of ED and inpatient LOS. The time that the patient left the ED derived from the Discharge Abstract Database was a manual data entry at the organization and, as such, human error may have led to potential issues with data quality issues.

To determine the effect of comorbidities on LOS, it may have been more appropriate to use the Charlson comorbidity index score; however, we chose the comorbid factor level because of available resources.

A significant limitation was that this study did not consider "alternate level of care" (i.e., patients no longer in need of acute care who are waiting to be discharged to a more appropriate care setting)[46] days in relation to inpatient LOS. It has been noted that a high volume of patients requiring an alternate level of care significantly impedes the flow of patients from emergency to inpatient care and, as such, this may warrant further analysis.[38]

CONCLUSION

This study reinforces the idea that continued efforts to reduce LOS in the ED may improve the flow of patients from emergency to inpatient wards. Our results showed a relation between ED and inpatient LOS, in that increased ED LOS was associated with increased inpatient LOS. Reducing LOS in the ED to the recommended 8-hour target set by the Ontario Ministry of Health and Long-term Care has the potential to free up resources, thus reducing access block in the ED as well as in inpatient wards. This would be contingent on patient flow being addressed as a parallel interdepartmental process.[33]

Patient age, comorbid factor level and sex influenced LOS. These factors may be important to consider when formulating solutions to improve patient flow, which in turn can affect patient outcomes, efficiency and cost.[8,27] Solutions to improving flow can be especially challenging in a rural community where patient volumes for noncritical cases may not warrant the cost to deliver a service (e.g., 24/7 laboratory or diagnostic imaging services) and resource shortages may limit the ability to deliver such services.[47]

Competing interests: None declared.

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Industrial wind turbines and adverse health effects

Roy D. Jeffery, MD, CCFP, FCFP
Manitoulin Island, Ont.

Carmen M.E. Krogh, BScPharm

Brett Horner, BA, CMA
Killaloe, Ont.

Correspondence to:
Roy Jeffery;
jeffery_07@sympatico.ca

This article has been peer reviewed.

Introduction: Some people living in the environs of industrial wind turbines (IWTs) report experiencing adverse health and socioeconomic effects. This review considers the hypothesis that annoyance from audible IWTs is the cause of these adverse health effects.
Methods: We searched PubMed and Google Scholar for articles published since 2000 that included the terms "wind turbine health," "wind turbine infrasound," "wind turbine annoyance," "noise annoyance" or "low frequency noise" in the title or abstract.
Results: Industrial wind turbines produce sound that is perceived to be more annoying than other sources of sound. Reported effects from exposure to IWTs are consistent with well-known stress effects from persistent unwanted sound.
Conclusion: If placed too close to residents, IWTs can negatively affect the physical, mental and social well-being of people. There is sufficient evidence to support the conclusion that noise from audible IWTs is a potential cause of health effects. Inaudible low-frequency noise and infrasound from IWTs cannot be ruled out as plausible causes of health effects.

Introduction : Des gens qui habitent à proximité des éoliennes industrielles affirment subir des effets préjudiciables pour leur santé et leur situation socio-économique. La présente analyse étudie l'hypothèse selon laquelle le désagrément causé par le bruit des éoliennes serait à l'origine de ces effets néfastes pour la santé.
Méthodes : Nous avons cherché dans PubMed et Google Scholar des articles publiés depuis 2000 et contenant les expressions « wind turbine health », « wind turbine infrasound », « wind turbine annoyance », « noise annoyance » ou « low frequency noise » dans le titre ou le résumé.
Résultats : Les éoliennes industrielles produisent un son qui est perçu comme étant plus désagréable que d'autres sources de bruit. Les effets signalés de l'exposition aux éoliennes industrielles correspondent à des effets de stress bien connus causés par des sons persistants non voulus.
Conclusion : Si elles sont situées trop près des habitations, les éoliennes industrielles peuvent avoir des effets préjudiciables pour le bien-être physique, mental et social des gens. Il existe suffisamment de preuves pour conclure que le bruit audible des éoliennes industrielles est une cause possible d'effets sur la santé. En outre, on ne peut écarter comme cause plausible d'effets sur la santé les sons de basse fréquence et les infrasons produits par ces éoliennes.

INTRODUCTION

Some people living in the environs of wind energy infrastructure experience negative health effects. Reported effects include annoyance, sleep disturbance, stress-related health impacts and reduced quality of life.[1–12] In some cases, Canadian families have effectively abandoned their homes, been billeted by wind energy developers or negotiated financial agreements with developers.[13]

A 2009 case series by Pierpont[6] included Canadian participants and

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documented symptoms reported by people exposed to industrial wind turbines (IWTs). Documented effects included sleep disturbance, headache, tinnitus, ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic episodes associated with sensations of internal pulsation or quivering when awake or asleep. Pierpont called the symptoms "wind turbine syndrome" and proposed the cause to be low-frequency noise (LFN) from IWTs or vibration stimulation of receptors of the human balance system.[6]

The American Wind Energy Association and Canadian Wind Energy Association sponsored a literature review to consider the existing literature on wind turbine noise and health.[14] Colby and colleagues[14] determined that "'wind turbine syndrome' symptoms are not new and have been published previously in the context of 'annoyance'" and are the "well-known stress effects of exposure to noise ...."

In this review, we consider the hypothesis of Colby and colleagues that the health effects from IWTs are the result of annoyance from the noise of audible IWTs.[14] We also discuss emerging knowledge on the effects of inaudible LFN and infrasound.

METHODS

We searched PubMed and Google Scholar for articles published since 2000 that included the terms "wind turbine health," "wind turbine infrasound," "wind turbine annoyance," "noise annoyance" or "low frequency noise" in the title or abstract.

We also considered additional documents received following author correspondence. Additional documents included, but were not limited to, government documents obtained by freedom-of-information requests and literature reviews.

RESULTS

Definitions: noise and health

The World Health Organization (WHO) defines noise as "unwanted sound."[15] Noise of a moderate level acts via an indirect pathway and can have health outcomes similar to those caused by high noise exposures on the direct pathway.[16] The main health risks of noise, identified by WHO, include the following: pain and hearing fatigue, hearing impairment, tinnitus, annoyance, interferences with social behaviour, interference with speech communication, sleep disturbance, cardiovascular effects, hormonal responses, and reduced performance at work and school.[17]

Canada supports the definition of health established in the 1948 WHO constitution: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[18] Michaud and colleagues state that "[u]nder this broad definition, noise-induced annoyance is an adverse health effect."[19]

In a document about the process of environmental assessments, Health Canada states that it "considers the following noise-induced endpoints as health effects: noise-induced hearing loss, sleep disturbance, interference with speech comprehension, complaints, and change in percent highly annoyed (%HA)."[20]

Effects of noise-induced annoyance

In a report on the health effects of wind turbines, the Minnesota Department of Health stated that "[t]he most common complaint in various studies of wind turbine effects on people is annoyance or an impact on quality of life."[21]

Annoyance has been defined as "... a feeling of displeasure associated with any agent or condition, known or believed by an individual or group to adversely affect them ...."[15] A causal chain exists between strong annoyance and increased morbidity,[22] and chronically strong annoyance must be classified as a serious human health risk.[23]

Symptoms associated with annoyance include stress, sleep disturbance, headaches, difficulty concentrating, irritability, fatigue, dizziness or vertigo, tinnitus, anxiety, heart ailments and palpitation. [24–26] In western European countries, noise-induced sleep disturbance and annoyance are estimated to account for 903 000 and 587 000 disability-adjusted life years, respectively.[27]

Industrial wind turbines can be harmful to health

Literature reviews have commented on the health effects of IWTs. Systematic audits of reviews reveal that some works contain errors of omission or commission.[28] One recurring error of omission is the failure to disclose that IWT noise acting via the indirect pathway can cause health effects.

A 2011 Ontario Environmental Review Tribunal considered evidence and testimony under oath and found that IWTs can be harmful to health if they are placed too close to residents.[29] The tribunal decision also found that

"serious harm to human health" includes ... indirect impacts (e.g., a person being exposed to noise and then exhibiting stress and developing other related symptoms). This approach is consistent with both the WHO definition of health and Canadian jurisprudence on the topic.[29]

Plausible causes of IWT-related health effects

Industrial wind turbines and related infrastructure can have a negative impact on living environments. Noise, visual impacts, stray voltage and socio-economic impacts related to IWTs are identified as plausible causes of adverse effects.

Electromagnetic waves in the form of poor power quality and ground current can adversely affect people who are electrically hypersensitive. Poor power quality and ground current have been documented at homes in proximity to Ontario IWTs.[30]

The National Research Council reports that

... to the extent that wind-energy projects create negative impacts on human health and well-being, the impacts are experienced mainly by people living near wind turbines who are affected by noise and shadow flicker.[31]

The blades of IWTs produce unavoidable shadow flicker bright enough to pass through closed eyelids, and moving shadows cast by the blades on windows can affect illumination inside buildings.[32] The Danish Energy Agency classifies shadow flicker from IWTs experienced by residents as a "nuisance."[33]

People exposed to shadow flicker from IWTs report negative effects to their health and well-being.[7] Currently, most jurisdictions in Canada do not have regulations that prevent negative effects from visual burdens caused by IWTs.

Noise from IWTs is more annoying than other noises

The Canadian Wind Energy Association suggests that modern wind turbines are not noisy.[34] European peer-reviewed studies consistently document that IWTs produce sound that is perceived to be more annoying than transportation or industrial noise at comparable sound pressure levels.[1,5]

In a 2006 report, the Académie nationale de médecine working group noted that IWT noise was the most frequent complaint.[35] The report described IWT noise as piercing, preoccupying and continually surprising because it is irregular in intensity, which distracts attention or disturbs rest. Industrial wind turbines have been blamed for other problems experienced by people living nearby, including subjective (headaches, fatigue, temporary feelings of dizziness and nausea), and objective (vomiting, insomnia and palpitations) manifestations.[35]

Health effects expected in rural Canada

Industrial wind turbines are sited in proximity to Canadian homes to enable access to transmission infrastructure.[36] Internal correspondence from the Ontario Ministry of the Environment, obtained through a freedom-of-information request, states, "It appears compliance with the minimum setbacks and the noise study approach currently being used to approve the siting of WTGs [wind turbine generators] will result or likely result in adverse effects ...."[37]

A report commissioned by the Ontario Ministry of the Environment concluded that the sound from wind turbines, at the levels experienced at typical receptor distances in Ontario, was

... expected to result in a non-trivial percentage of persons being highly annoyed ... research has shown that annoyance associated with sound from wind turbines can be expected to contribute to stress related health impacts in some persons.[38]

Noise annoyance in rural Canada is extremely low.[39,40] Canadian communities with populations of less than 5000 report that about 70% are "not at all annoyed" by noise outside their home.[19]

Health Canada's examination of the scientific literature on noise from IWTs determined the health effect "conclusively demonstrated" from exposure to wind turbine noise is an increase of self-reported general annoyance and complaints (i.e., headaches, nausea, tinnitus and vertigo).[41] Members of Health Canada's Consumer and Clinical Radiation Protection Bureau propose a sound limit of 45 dBA for IWTs and predict an increase in the percentage of Canadians highly annoyed by noise from IWTs.[42–44]

A noise immission level of 45 dBA from IWTs can be expected to result in "... less than 14% of the exposed population to be highly annoyed indoors by wind turbines and less than 29% to be highly annoyed outdoors."[45]

There is a greater expectation for, and value placed on, "peace and quiet" in quiet rural settings.[44,46] Such settings in Ontario can have ambient sound levels below 30 dBA.[37] Annoyance from IWT noise starts at dBA sound pressure levels in the low 30s and rises sharply at 35 dBA.[1,3,5] Research suggests that IWT noise limits should be set at 32 dBA outside residences.[9] A 2010 memorandum of the Ontario Ministry of the Environment recommended

that IWT "... setback distances should be calculated using a sound level limit of 30 to 32 dBA at the receptor ...."[37] Ontario guidelines for IWT noise currently permit up to 51 dBA.[47]

A health survey of people exposed to IWTs in Ontario reported altered quality of life, sleep disturbance, excessive tiredness, headaches, stress and distress.[7] Predicted probability of health effects diminished with increased distance between the IWT and the participant's property.[7] Nissenbaum and colleagues[12] also documented a reduction of effects with increased distances of IWTs from residences. These findings are consistent with the physics of sound decay through absorption by the ground and atmosphere.

Negative attitudes toward IWTs have been suggested as a cause of annoyance complaints.[14,48] However, researchers have found that IWTs were initially welcomed into the communities for their perceived environmental[8] or economic[12] benefits. As Krogh states, "[t]he reported adverse impacts were unexpected."[13]

Characteristics of IWT noise

The sound of IWTs is very easily perceived[49] and is difficult to mask.[1,5] The characteristics of IWT noise that are identified as plausible causes for reported health effects include amplitude modulation,[50] audible low-frequency noise (LFN),[21] infrasound,[51] tonal noise, impulse noise and night-time noise.[5]

Amplitude modulation and impulse noise

Modern IWTs routinely produce audible amplitude modulation. Leventhall[50] reports that "[a] time-varying sound is more annoying than a steady sound of the same average level and this is accounted for by reducing the permitted level of wind turbine noise." Pedersen and van den Berg[52] state that "[f]rom various studies it follows that this modulation is equivalent in annoyance to the un-modulated sound at an approximately 5 dB higher level." Ontario noise guidelines require a 5 dBA adjustment for industrial noise that has amplitude modulation[53] but not for IWTs.[47] Industrial wind turbines also produce impulsive sound, which can be unexpected and disturbing to residents.[9,54]

Audible LFN

Modern IWTs routinely produce audible LFN.[38] As IWTs have increased in size, so has the LFN part of the sound spectrum. For modern IWTs, it is

> ... beyond any doubt that the low-frequency part of the spectrum plays an important role in the noise .... It must be anticipated that the problems with low-frequency noise will increase with even larger turbines.[55]

Annoyance from audible LFN is acknowledged to be more severe in general.[15] Low-frequency noise does not need to be considered loud for it to cause annoyance and irritation.[25] It causes immense suffering to those who are sensitive to it,[24] and chronic psychophysiological damage may result from long-term exposure to low-level LFN.[56]

Infrasound and inaudible LFN

Industrial wind turbines also produce infrasound and/or inaudible LFN. There is debate about the impact from these low frequencies of noise.[38] It has been suggested that these low frequencies are not sufficient to result in negative effects.[14,48,50] However, Farboud and colleagues[57] state that "... there is an increasing body of evidence suggesting that infrasound and low frequency noise have physiological effects on the ear." Salt and Kaltenbach[58] report, "[b]ased on well-documented knowledge of the physiology of the ear and its connections to the brain, it is scientifically possible that infrasound from wind turbines could affect people living nearby."

In a 1990 NASA technical paper, Hubbard and Shepphard[59] report that

> [p]eople who are exposed to wind turbine noise inside buildings experience a much different acoustic environment than do those outside. ... They may actually be more disturbed by the noise inside their homes than they would be outside. ... One of the common ways that a person might sense the noise-induced excitation of a house is through structural vibrations. This mode of observation is particularly significant at low frequencies, below the threshold of normal hearing.[59]

Low-frequency noise produced by some IWT projects in Ontario has been found to be inaudible outside the home but audible inside and "... quite annoying to the occupants."[37]

Low-frequency noise from IWTs has resulted in reported annoyance, sleep deprivation and uninhabitable living conditions.[37] To escape the noise, some Ontarians report sleeping in vehicles, tents, trailers, basements lined with mattresses, garages, and at the homes of relatives or friends.[13] Ontario does not have "... measurement procedures or criteria for addressing indoor noise intrusions due to wind turbines ...."[38]

In 2012, a board of health resolution concerning an IWT project in Brown County, Wisconsin, requested

> ... temporary emergency financial relocation assistance from the State of Wisconsin for those Brown County families that are suffering adverse health effects and undue hardships caused by the irresponsible placement of industrial wind turbines around their homes and property.[60]

A 2012 cooperative measurement survey and analysis of LFN and infrasound at the location concluded,

> [t]he four investigating firms are of the opinion that enough evidence and hypotheses have been given herein to classify LFN and infrasound as a serious issue, possibly affecting the future of the industry. It should be addressed beyond the present practice of showing that wind turbine levels are magnitudes below the threshold of hearing at low frequencies.[61]

In 2013, research funded by the Ontario Ministry of the Environment indicated a statistically significant relation between residents' distance from the turbine and the symptoms of disturbed sleep, vertigo and tinnitus, and recommended that future research focus on the effects of wind turbine noise on sleep disturbance and symptoms of inner ear problems.[62]

CONCLUSION

Health is one of the fundamental rights of every human being. Some people exposed to IWTs experience negative effects to their physical, mental and social well-being. There is sufficient evidence to support the hypothesis of Colby and colleagues[14] that documented symptoms can result from annoyance to audible IWTs. Amplitude modulation of IWTs, audible LFN, and tonal, impulse and nighttime noise can contribute to annoyance and other effects on health. In addition, there is emerging evidence that suggests inaudible LFN or infrasound from IWTs may result in negative health effects.

Further research is required to clarify the exact role that sound characteristics, visual impacts, stray voltage and socioeconomic impacts of IWTs may have on human health. As more IWTs are installed, rural physicians are likely to be presented with increasing numbers of patients who are adversely affected. Based on current knowledge, we expect that, at typical setback distances and sound pressure levels of IWTs in Ontario, a nontrivial percentage of exposed people will be adversely affected. "Trade-offs" of health for perceived benefit in alternate forms of energy can be prevented if setback distances and noise limits are developed using established noise management techniques. In addition to providing care for affected patients, rural physicians have a responsibility to advance understanding and to help inform IWT regulations that will protect the physical, mental and social well-being of patients.

Competing interests: None declared.

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Descriptive Article
Article descriptif

A community-based approach to the treatment of pain and addiction

Maureen A. Allen, MD, BN, CCFP(EM)
St. Martha's Regional Hospital, Antigonish, NS

Correspondence to: Maureen Allen; jimandmoe@eastlink.ca

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The need for a national plan to address pain and addiction has never been more urgent. More crucial, however, is the development of grassroots strategies to address the unique challenges faced by rural communities.

The data on abuse of prescription drugs have been sobering. Globally, it has been estimated that North Americans consume a staggering 80% of the world's opiates.[1] More alarming still is the corresponding death rate attributed to prescription opiates, which has surpassed that of both heroin and cocaine.[2] Canada has become the second largest per capita consumer of prescription opiates, next to the United States.[1] Dr. Thomas Frieden, director of the Centers for Disease Control and Prevention, stated in a 2011 address to physicians that "the number of deaths from prescription opioids had surpassed those from car crashes, heroin, crack cocaine, firearms and suicide combined in some US states."[3,4] Despite these sobering statistics, only 9% of physicians surveyed viewed prescription drugs as a major problem.[5]

The need for physicians and other health care providers to be part of the solution to this public health disaster is evident. We need to come together with stakeholders to not only advocate for patients, but also to show leadership and solidarity within our communities.

OUR DISTRICT HEALTH AUTHORITY

The following pain and addiction strategy was developed in collaboration with multiple stakeholders within our community of Antigonish, NS. Stakeholders included addiction services, palliative and chronic pain services, pharmacy, psychiatry, quality and risk managers, family physicians and emergency personnel.

The town of Antigonish boasts a population of 5000 and has a regional hospital with a capacity of 79 acute care beds and 10 alternative-level beds. Medical support is provided by 20 family doctors, 1 cardiology nurse practitioner, and specialist support in internal medicine, general surgery, psychiatry, anesthesiology, obstetrics and pediatrics. Within our service catchment area of 8000 km^2, 3 other smaller health care facilities exist. Together, these 4 facilities serve a total population base of 44 515. All of these facilities offer emergency and inpatient services around the clock.

Specialty pain resources in our district include a community-based chronic pain clinic, which offers services 1 day a week. The clinic is built on a model of collaborative care and includes a local physician, an occupational therapist, a physiotherapist and a social worker who works in our psychology department. The team helps patients establish goals of care specific to their needs. Patients are then offered an 8-week pain self-management program, which is provided by the chronic pain team and encompasses broader concepts of pain management. Patients are referred to the clinic by family physicians, emergency departments and nurse practitioners. Our community wait list to access chronic pain services dropped substantially when our chronic pain clinic was introduced and made referrals more timely and relevant to patients' needs. Some clients from our district had been on a provincial wait list to access chronic

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pain services for 4 years when our program was first implemented in January 2008. To date, our wait times have decreased to 4 months.

Other specialty services that address pain and suffering in our community include a palliative care team of 3 physicians, who share one full-time position, and 5 nurse consultants. This is an inpatient and community-based resource that is offered within the district to all facilities.

INTRODUCING A PAIN AND ADDICTION STRATEGY

The pain and addiction strategy was introduced into our 12-bed emergency department in Antigonish with the plan of implementing it in other district facilities that offer emergency services.

The strategy was put into practice to help address high-risk patterns of controlled substance use and to offer tools to health care personnel to manage pain in acute and chronic care settings, as well as at the end of life. For patients with a history of chronic pain who used the emergency department on a regular basis to manage flare-ups, a comprehensive pain plan was developed that incorporated involvement of the patient, their family physician and others involved in the patient's care.[6] Our goal was to gently guide patients to the program while offering clinicians tools to manage patients' flare-ups when they presented to the emergency department.

LITERATURE REVIEW

Models of care that address pain and addiction in rural communities are difficult if not impossible to find in the literature. A MEDLINE search did not reveal any comparable strategy to what our district introduced. There is, however, an emerging body of evidence that is recognizing the role of pain plans in the emergency department for patients with a complex history of pain.[6] The basis of the pain plan is to help patients find more effective strategies to manage their complex pain through pain self-management programs and other legitimate pain services. Other models of care have addressed pain and addiction individually,[7–9] but we were unable to find any models that addressed both in a comprehensive way.

PROGRAM OBJECTIVES

We had 5 program objectives:

1. To provide physicians and health care providers with a comprehensive approach to the treatment of pain and addiction based on best practice.

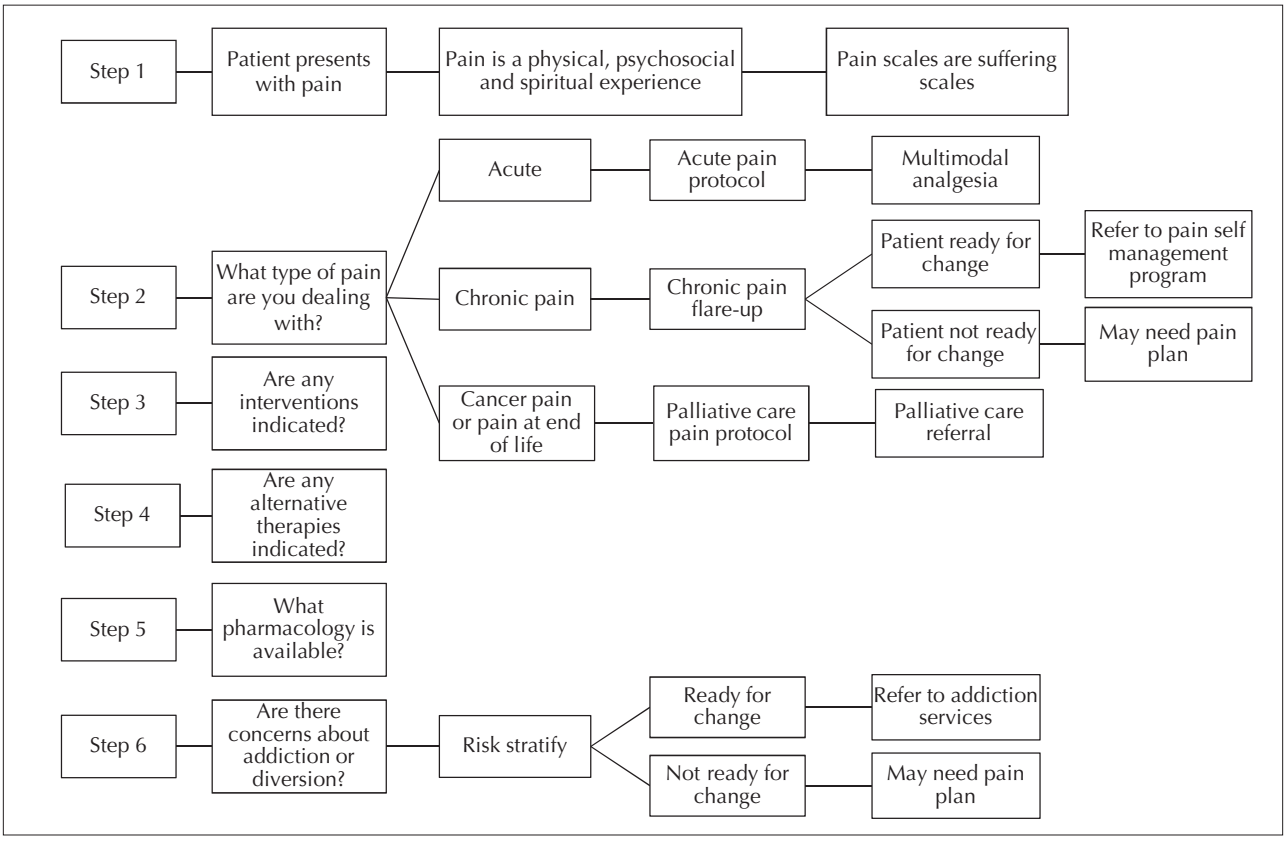

Fig. 1. A 6-step approach to treating pain and addiction.

2. To offer physicians and health care providers standardized protocols to address acute and chronic pain, and painful conditions near the end of life.
3. To reduce the dispensing of opiate refills and parenteral injections in patients with flare-ups of chronic pain who present to the emergency department.
4. To direct patients with a complex history of pain to a community-based pain program. For those not ready to attend a pain program, a comprehensive pain plan would be developed with the patient and family physician to ensure continuity and cohesiveness within the community and emergency department.
5. To stratify all patients by risk of addiction and diversion when considering controlled substances, regardless of the pain presentation, and if necessary, to direct patients to appropriate resources and services within the community.

DESCRIPTION OF THE PAIN AND ADDICTION STRATEGY

With these objectives guiding the development of our strategy, we built a 6-step approach that incorporated simple tools to address pain and addiction in the emergency department (Fig. 1). Patients identified as needing a more cohesive departmental approach to pain and addiction were individuals who continued to use the emergency department as a way of coping with flare-ups of chronic pain but were not yet ready to consider a pain self-management program as a way to help them move forward. Alternative pharmacology was introduced; if opiates were used in this population they were used orally, and patients were given medication to improve function rather than pain[10] (Fig. 2). The decision to move away from opiate use was based on an emerging body of evidence that recognized the limited scope of opiates in chronic pain and concerns that opiates were contributing to poorer outcomes in the long term.[11–13]

Pain plans were discussed with the patient and his or her family physician. Patient files were kept in the emergency department in a confidential, secure location and, with patients' consent, shared with other health personnel involved in their care.[14]

It was also important to rule out any new pathology that could be causing the increase in a patient's baseline pain and to be able to shift our focus from management of chronic pain to acute pain, if required. A flare-up of chronic pain was defined as an increase in the patient's baseline pain that was not the result of new pathology or the progression of pre-existing disease.[15]

Tools used to stratify for risk of addiction and diversion included our provincial prescription monitoring program, urine drug testing and screening for high-risk or aberrant behaviour.[4] Physicians were educated on the challenges and limitations of using urine drug testing in the emergency department despite it being the "gold standard" in monitoring for drug compliance and detecting the use of illicit substances.[2,16]

Other strategies we incorporated included a no-refill policy for controlled substances among patients followed by a prescriber, and we no longer accepted written orders for parental opioids for patients with chronic disease. These patients were triaged, assessed and managed like other patients who came to the emergency department for care. We also introduced a nurse-initiated parental protocol for acute pain, and symptom protocols with suggested orders for patients with conditions at the end of life.[17] This gave emergency personnel tools to initiate treatment in our palliative care population until referrals could be made.

One contentious area that we addressed was the withdrawal of meperidine from our emergency department. Meperidine had become the drug of choice for the management of chronic pain flare-ups in our department. Our goal was to help patients break the cycle of meperidine use and help them move toward self-management of pain. This act alone reduced visits to our emergency department by two-thirds, with little opposition from our colleagues or patients.

ADVANTAGES AND LIMITATIONS

The primary advantage of our pain strategy was a drop in the frequency of emergency department visits among individuals with recurrent chronic pain flare-

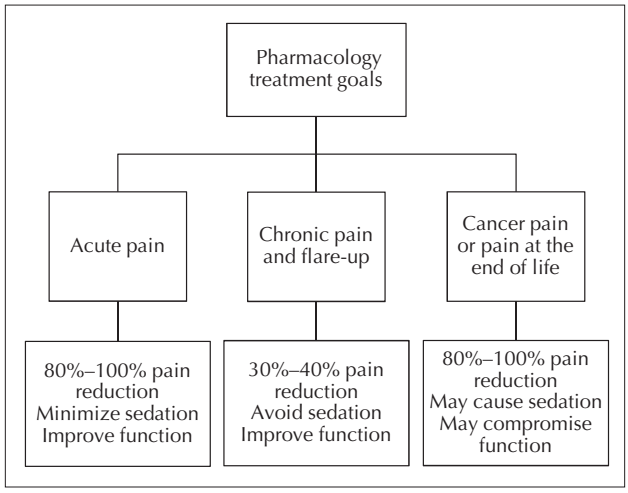

Fig. 2. Pharmacology treatment goals.

ups. Some patients stopped visiting completely after they had attended our community-based pain self-management program. Family physicians also reported a drop in the frequency of visits to their offices.

Most staff members commented on the value of having a plan in place that summarized the complex histories and numerous investigations many of the patients had undergone. Staff began to appreciate the complexity of patients' history of pain, and care became noticeably less punitive and more compassionate. There was a feeling of unification within the department when addressing the care of patients with complex pain.

Some physicians and emergency personnel, however, did have difficulty with the strategy. They felt the restrictions on opiate dispensing in chronic pain were unfair to patients. With time, they began to shift their thinking as the frequency of patient visits declined.

Although this is difficult to measure, we feel the program achieved a lower pill burden within our community, thereby decreasing the risk of unintentional and intentional deaths from controlled substances. Other benefits included a decrease in complaints to administration for inadequate pain management.

Limitations included human resources to ensure knowledge retention and to educate new staff about the pain strategy. It was also a challenge to collect and decipher data, because no collection system existed. If support staff were needed, often they were reassigned from other posts, which increased their workload.

Another challenge was the establishment of a formal review process to re-evaluate program objectives and discuss any roadblocks that could be occurring. The long-term plan is to incorporate pain and addiction reviews into our quality program and our quarterly family practice and departmental meetings. At present, weekly reviews occur informally between chronic and palliative care teams and emergency personnel.

CONCLUSION

The development of a collaborative pain and addiction strategy has the power to bring together a community. Simple tools can be developed to ensure patients are provided effective and timely pain relief in a nonjudgmental and compassionate manner while keeping them and our communities safe.

Departmental pain plans done in collaboration with patients and their family physicians have been shown to be effective in addressing patients with complex pain histories. Pain plans also allow clinicians to manage risk while providing care in a humane and comprehensive way. Ultimately, our goal is to empower patients to become less reliant on the health care system and more in control of their health care needs.

Competing interests: None declared.

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The occasional prolotherapy for lateral epicondylosis (tennis elbow)

Francois Louw, MD, CCFP, DA(SA), MBChB(Pret)
Department of Family Practice, University of British Columbia, Chisel Peak Medical Clinic, Invermere, BC

Correspondence to: Francois Louw; whatsupdok@shaw.ca

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Lateral epicondylosis (formerly epicondylitis), a common overuse condition causing musculoskeletal pain, can be resistant to treatment. Whereas the precise cause of pain is unclear, the etiology of the condition is degenerative in nature, rather than inflammatory. The primary clinical concerns are pain and weakness at the common extensor origin (especially that of the extensor carpi radialis brevis tendon, 1–2 cm distal to its attachment on the lateral epicondyle). Surrounding soft tissue may also be involved.

Tendinopathies and enthesopathies are understood to be primarily degenerative conditions. Thus, current research has focused on addressing this presumed pathophysiology with injectants that may contribute to collagen healing and thereby decrease pain.

Prolotherapy is an injection therapy whose primary intent is to repair damaged connective tissue (i.e., ligament, tendon or cartilage). "Proli" is Latin for "to grow."

The term "prolotherapy" was popularized when early practitioners appreciated tissue hypertrophy after prolotherapy injections using solutions that are currently no longer in use. Although the mechanism of action is not clearly known, it has been reported to be a combination of (brief) local inflammatory effects, induction of local growth factor release and downregulation of neuropathic inflammation.

Injectants such as hyperosmolar dextrose and platelet-rich plasma are both used as regenerative solutions, which may act primarily on collagen fibres, in comparison to other standard of care treatments such as corticosteroid injections and nonsteroidal anti-inflammatory drugs. Once the mainstay for refractory tennis elbow, corticosteroid injections now appear not to be an effective option because they are linked to poorer long-term outcomes.[1]

Prolotherapy and injection of platelet-rich plasma have become more popular over the last few years. Evidence for their use in lateral epicondylosis is accumulating,[2–5] as well as for other chronic musculoskeletal conditions.[6,7] A good peer-reviewed clinical article is available on the subject.[8] The judicial use of prolotherapy by a trained operator may be appropriate for selected patients refractory to more conservative treatments. The following describes a method used in my clinic.

CASE DESCRIPTION

Ms M.C. is a right-handed 32-year-old health care aid, whose job duties include assisting a quadriplegic patient with transferring, dressing and general grooming. She also applies compressive stockings on a daily basis, "which are very difficult to get on." She presents with pain in the right lateral epicondyle region, and has had only partial benefit from physiotherapy and shock wave therapy. She has also tried a corticosteroid injection, with pain relief lasting for only about a week.

PATIENT SELECTION AND PREPARATION

All patients should be counseled, as for any procedure, about the potential benefits and adverse reactions. Common (> 25%) adverse reactions include discomfort or mild pain at the injection site, bruising and mild swelling, and

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itching at the injection site for 1–2 days. Uncommon (< 0.1%) reactions include allergic reaction to the solution, infection, and nerve or vascular injury.[8]

Patients should be advised to stop taking nonsteroidal anti-inflammatory drugs and corticosteroids for at least a week before injection, and for at least 3 weeks after treatment, because these drugs interfere with the inflammatory cascade that is necessary for optimal healing. Simple analgesics such as acetaminophen and weak opioids such as tramadol are fine.

Patients who smoke should be counseled to quit, because tobacco use decreases healing of collagen. Patients with an allergy to lidocaine, which is rare, should be counseled about potential alternate treatments.

METHOD

A knowledge of the anatomy of the surface and deeper structures of the elbow is required (Figs. 1 and 2).

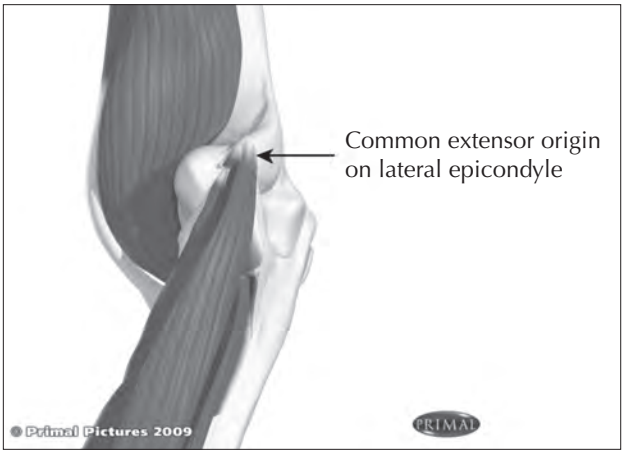

Fig. 1. Left elbow showing muscle origins and entheses. Reproduced with permission from Primal Pictures Ltd. (www.primalpictures.com).

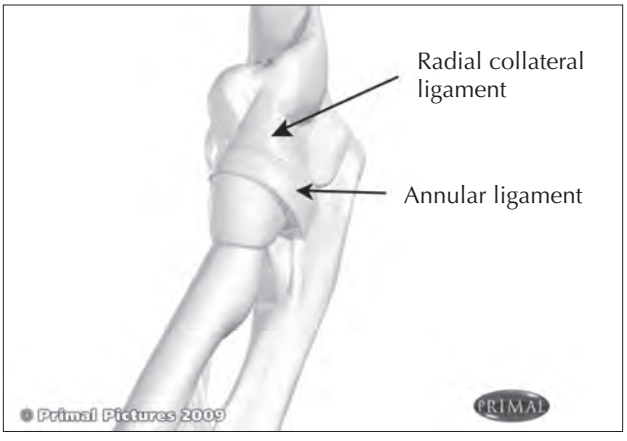

Fig. 2. Left elbow showing deeper ligaments. Reproduced with permission from Primal Pictures Ltd. (www.primal pictures.com).

1. Gather the materials you will need (Fig. 3). Injectate: 12.5% dextrose in 0.75% lidocaine (prepare by adding 1.25 mL of 50% dextrose to 3.75 mL of 1% lidocaine to a total volume of 5 mL). Prepare a sterile dressing tray.
2. Clean the skin with chlorhexidine and alcohol, and take aseptic precautions.
3. Analgesic skin wheals are not routinely used, but a topical anesthetic spray may be used.
4. Using a 27-gauge 1/2-inch needle, inject the origin (the enthesis) of the extensor carpi radialis brevis, as well as tender areas involving the annular ligament (the ligament spanning across the radial head) with 0.3–0.5 mL per tender site (Figs. 4–6).
5. Use a barbotage approach with multiple small injections, and do the injections on periosteal contact (i.e., gently "on bone") because this area is rich in afferent nerves that maintain a neuropathic pain state.

Prolotherapy can be guided by ultrasound (a high-frequency linear probe such as the SonoSite 13-6 MHz transducer with a SonoSite M-Turbo machine is practical), but ultrasound guidance is not necessary for the elbow, and this procedure can easily be done in the office.[3]

Fig. 3. Simple tray setup.

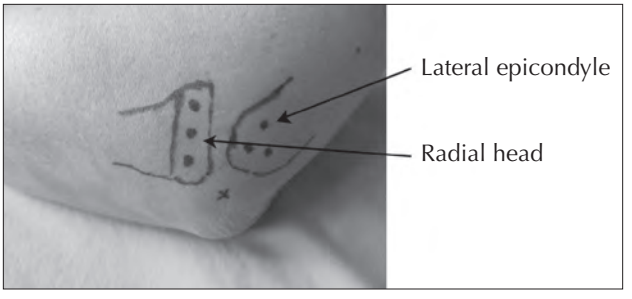

Fig. 4. Potential injection sites (lateral epicondyle and annular ligament) on the left elbow. "X" shows the entry site for intra-articular injection (rarely needed).

Injections are done monthly. Substantial relief is usually obtained after the second or third treatment.

It is very important for patients to do eccentric loading exercises involving the common extensor tendons of the forearm (loading the tendons while they lengthen with a dumbbell or elastic tubing). This can be started 2 days after treatment, or as soon as the treated area allows it, under the guidance of a physiotherapist. Our clinic uses a very slow ramp up and encourages relative rest from pain-producing activities.

CONCLUSION

Prolotherapy requires some training, and various good courses address this (see www.hacketthemwall.org and www.aaomed.org).

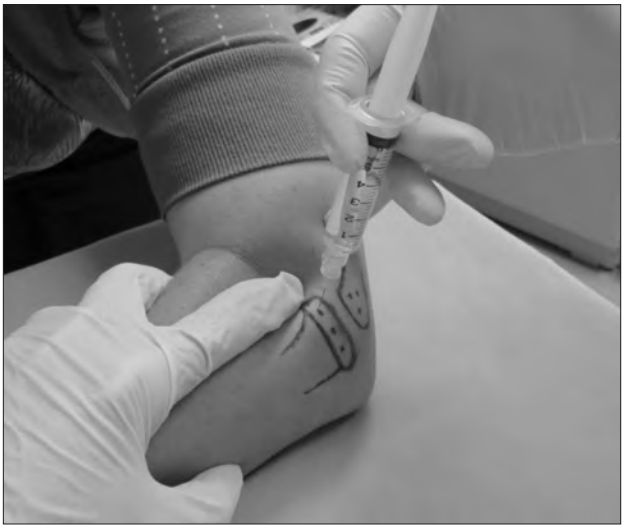

Fig. 5. Injection into the annular ligament. The injector's finger is pushing the musculature, and radial nerve more medially, so as not to cause a (temporary) wrist drop.

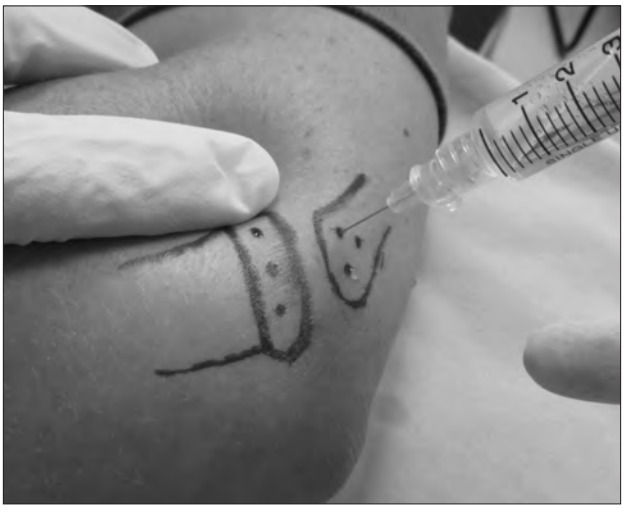

Fig. 6. Injection into the lateral epicondyle. Injection trajectory is at 90 degrees to the structure being injected.

Prolotherapy is a safe, economical and effective intervention for pain associated with lateral epicondylosis. Rural physicians should consider it as a treatment option for lateral epicondylosis, especially when more conservative approaches have not been successful.

Competing interests: None declared.

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Country Cardiograms

Have you encountered a challenging ECG lately?

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

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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

SRPC report on the first World Summit on Rural Generalist Medicine

Braam de Klerk, CM, MB ChB
Inuvik, NT

SRPC administration (admin@srpc.ca) can provide copies of the Cairns Consensus, as well as some of the reports that were written by Canadian attendees to those interested.

Participants from 20 countries convened at Cairns, Australia, from Oct. 30 to Nov. 2, 2013. A large contingent representing the SRPC and Canada attended the first World Summit on Rural Generalist Medicine and, afterwards, the continuing medical education event Rural Medicine Australia 2013. We were asked to deliver a keynote speech, followed by a Canadian presentation. Both were well received, and the Canadian team was invited to be part of the group that wrote the Cairns Consensus.

My feeling (shared by many others) is that this summit was a historic and watershed event and that much good can flow from it for rural populations the world over. Time will tell.

To quote Dr. Richard Murray, dean of James Cook University in Queensland and president of the Australian College of Rural and Remote Medicine (ACRRM),

> [w]e have a sense that the meeting may be something of a turning point in the rural medicine and rural generalism cause, certainly in Australia and perhaps internationally. The fantastic support from yourself and the big Canadian contingent has been critical to that.

The Cairns Consensus aims to define the generalist approach, to describe what action has been taken to date and what the way forward should be. The summit recommends the following: that rural medical generalist pathways be supported and implemented, that rural generalist medicine be recognized as a discipline, that generalist curricula be introduced to university programs, and that ACRRM curriculum be considered as a reference point for postgraduate training.

Rural generalist medicine embraces the Triple C principles of The College of Family Physicians of Canada: competency-based curriculum of comprehensive care, focused on continuity of education and patient care, and centred in family medicine.

I had the privilege of visiting the Cape York region (very similar to the Inuvik region — except for the weather) with Dr. Ruth Stewart, director of the Rural Clinical Training Scheme at James Cook University. We visited a medium-sized hospital (providing obstetrics, anesthesia and surgery, run by general practitioners) and a much smaller, remote hospital that, after many years, is reopening their labour ward, as well as their operating room. This was made possible by the first few cohorts of rural medical generalists now entering rural practice. We also visited 3 community health centres, run by nurses with weekly visits by physicians. These health centres are also benefitting from the recent influx of rural physicians. This is not to say that all is moonshine and roses. They, as we do, still have considerable barriers to overcome, but they are reaping the benefits of the rural curriculum and the rural social accountability of Australian universities and the provincial and federal governments.

There is a strong possibility that there will be a second summit on generalism in 2015, and we have tentatively been asked to host it in conjunction with our April 2015 Rural and Remote Medicine Course in Montréal.

Competing interests: None declared.

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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

Rust ring removal

Thank you for the excellent recent article on rust ring removal.[1] As a rural ophthalmologist, I would like to add a few points.

Iron is toxic to intraocular tissue. Rust ring injuries often induce "iron iritis" with photophobia adding to the foreign-body discomfort. This usually does not require steroids for treatment. A cycloplegic, such as tropicamide, will provide symptomatic relief. Removal of the rust ring is the definitive treatment, but it often takes a few days for the iritis symptoms to settle. Warn the patient that the drops will induce temporary presbyopia.

Traditional teaching suggests using a hypodermic needle for foreign-body removal. This is the wrong tool for the job! It is like trying to eat Jell-O with a knife. A "golf club spud" is much safer and easier to use. The Alger Brush is an excellent instrument and very safe. Because it "stalls out" if too much pressure is applied, it will not drill through the intact corneal stroma. Really.

The rust-stained cornea will soften over about 3 days. If the rust ring does not come off easily on the first try, use a topical antibiotic as for a corneal abrasion and let the epithelium heal over. Have the patient return 3 days later for definitive rust removal, which will be much easier and more complete than if it had been attempted at the initial presentation. Warn the patient that he or she has a new abrasion and will need to restart the topical antibiotic.

Rust ring injuries will likely produce a small, permanent corneal scar. If the injury site is outside the pupillary aperture, it will have no visual consequences. If it is within the pupillary aperture, it may produce glare or a slight decrease in vision. For these injuries, it is wise to refer the patient to an ophthalmologist, especially if the injury occurred in the workplace.

Intraocular metallic foreign bodies are easily missed if not considered at presentation. Some metals are toxic to the retina and can cause blindness months after the injury. Metallic foreign bodies are usually caused by metal impacting on metal. Anyone presenting with a foreign-body injury should be asked, "What were you doing at the time you first felt something in your eye?" If the patient was close to an impact tool and not wearing eye protection, assume an intraocular metallic foreign body until ruled out with plain radiography. Because radiographic artifacts can be mistaken for metallic foreign bodies, confirmation should be obtained with multiple views. An intraocular location can be diagnosed by movement of the foreign body with radiography views in different gaze directions.

Bruce Woodburn, MD, FRCS(C)
Sechelt, BC

Reference

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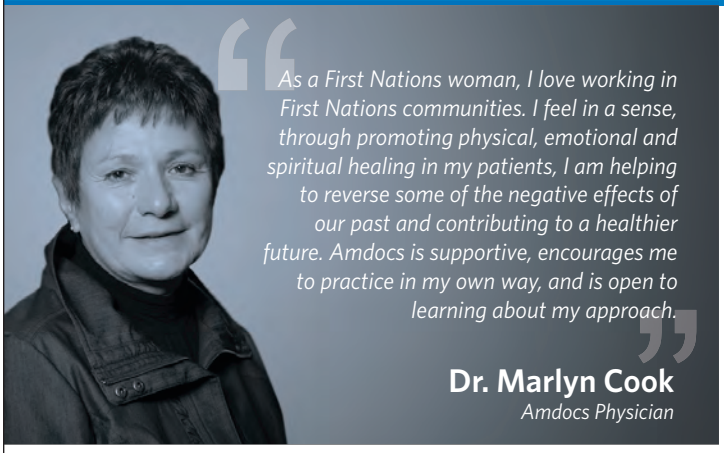

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Please contact Darren Compton on +61 (02) 8356 3100 or dcompton@ochrehealth.com.au to discuss this opportunity

RM-310

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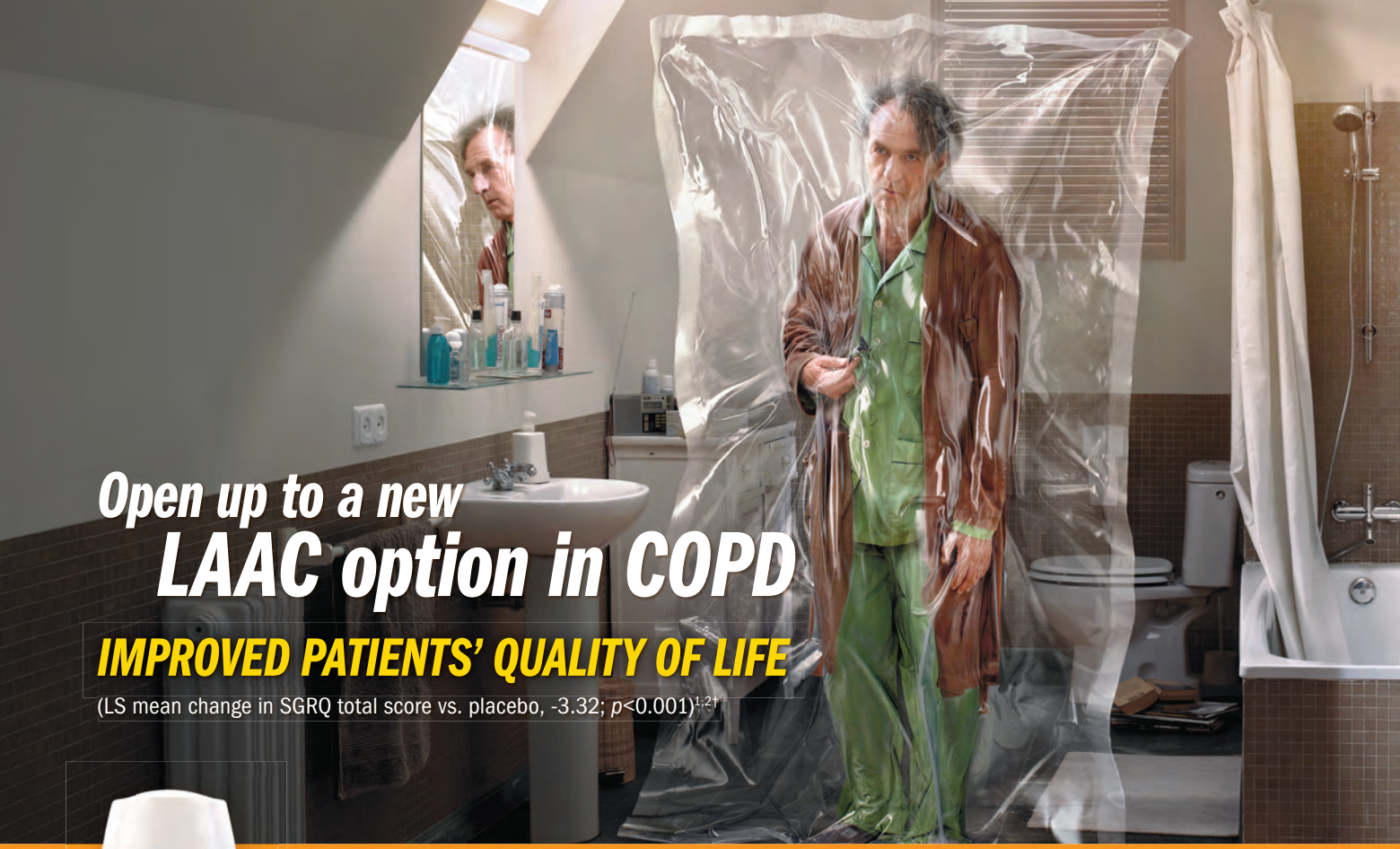

Open up to a new LAAC option in COPD

IMPROVED PATIENTS' QUALITY OF LIFE

(LS mean change in SGRQ total score vs. placebo, -3.32; $p<0.001$)[1,2†]

NEW ONCE-DAILY Pr SEEBRI* BREEZHALER*

DEMONSTRATED 5-MINUTE ONSET AND 24-HOUR BRONCHODILATION

- FEV_1 improvement shown 5 minutes after first dose (0.093 L vs. placebo, $p<0.001$, serial spirometry)[1,3‡]
- Significantly greater LS mean FEV_1 vs. placebo demonstrated at all time points over 24 hours (LS mean FEV_1 [L] vs. placebo after first dose, $p<0.001$; time points were 5 min, 15 min, 30 min, 1 hr, 2 hrs, 3 hrs, 4 hrs, 6 hrs, 8 hrs, 10 hrs, 12 hrs, 23 hrs 15 min, 23 hrs 45 min)[4§]

Indication & clinical use:

SEEBRI* BREEZHALER* is indicated as a long-term once-daily maintenance bronchodilator treatment in patients with chronic obstructive pulmonary disease (COPD), including chronic bronchitis and emphysema.

- Not indicated for the relief of an acute deterioration of COPD
- Can be used at the recommended dose in elderly patients 65 years of age and older
- Should not be used in patients under 18 years of age

Relevant warnings and precautions:

- Not indicated for treatment of acute episodes of bronchospasm
- Not indicated for treatment of acutely deteriorating COPD
- Worsening of narrow-angle glaucoma
- Worsening of urinary retention
- In severe renal impairment, use only if the expected benefit outweighs the potential risk
- Paradoxical bronchospasm

For more information:

Please consult the Product Monograph at www.novartis.ca/asknovartispharma/download.htm?res=seebri%20breezhaler_scrip_e.pdf&resTitleId=665 for important information relating to adverse events, drug interactions, and dosing information which have not been discussed in this piece. The Product Monograph is also available by calling the Medical Information department at 1-800-363-8883.

LAAC: long-acting anticholinergic; COPD: chronic obstructive pulmonary disease; LS: least square; SGRQ: St. George's Respiratory Questionnaire; measures health-related quality of life in symptoms, activities and impact on daily life;[5] FEV_1: forced expiratory volume in 1 second.

† GLOW2: A 52-week, randomized, double-blind, placebo-controlled parallel-group study of 1,060 patients with COPD. Patients received either SEEBRI* BREEZHALER* (glycopyrronium 50 mcg o.d.; n=525), placebo (n=268), or open-label tiotropium (18 mcg o.d.; n=267) as an active control. Primary endpoint was 24-hour post-dose (trough) FEV_1 following 12 weeks of treatment.

‡ GLOW1: A 26-week, randomized, double-blind, placebo-controlled parallel-group study to assess the efficacy, safety and tolerability of once-daily SEEBRI* BREEZHALER* (50 mcg) in patients with COPD (n=550); placebo (n=267).

§ LS mean FEV_1 (L) after first dose; SEEBRI* BREEZHALER* (n=169) vs. placebo (n=83), respectively: 5 min: 1.39 vs. 1.30; 15 min: 1.43 vs. 1.28; 30 min: 1.44 vs. 1.28; 1 hr: 1.47 vs. 1.28; 2 hrs: 1.53 vs. 1.34; 3 hrs: 1.53 vs. 1.35; 4 hrs: 1.52 vs. 1.35; 6 hrs: 1.48 vs. 1.33; 8 hrs: 1.47 vs. 1.33; 10 hrs: 1.47 vs. 1.32; 12 hrs: 1.45 vs. 1.31; 23 hrs 15 min: 1.37 vs. 1.27; 23 hrs 45 min: 1.39 vs. 1.31; $p<0.001$ for all time points.

References: 1. SEEBRI* BREEZHALER* Product Monograph. Novartis Pharmaceuticals Canada Inc., October 12, 2012. **2.** Kerwin E, Hébert J, Gallagher N *et al.* Efficacy and safety of NVA237 versus placebo and tiotropium in patients with COPD: the GLOW2 study. *Eur Respir J* 2012;40:1106-14. **3.** D'Urzo A, Ferguson GT, van Noord JA *et al.* Efficacy and safety of once-daily NVA237 in patients with moderate-to-severe COPD: the GLOW1 trial. *Respir Res* 2011;12:156(1-13). **4.** Data on file. Novartis Pharmaceuticals Canada Inc. **5.** Jones P. St. George's Respiratory Questionnaire Manual. Available from: www.healthstatus.sgul.ac.uk/SGRQ_download/SGRQ%20Manual%20June%202009.pdf. Accessed December 5, 2011.

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Novartis Pharmaceuticals Canada Inc.
Dorval, Québec H9S 1A9
www.novartis.ca
514.631.6775 514.631.1867

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Product Monograph available on request.
Exp: 05/2014
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Member PAAB R&D

New Once Daily Pr seebri* breezhaler*
Glycopyrronium inhalation powder