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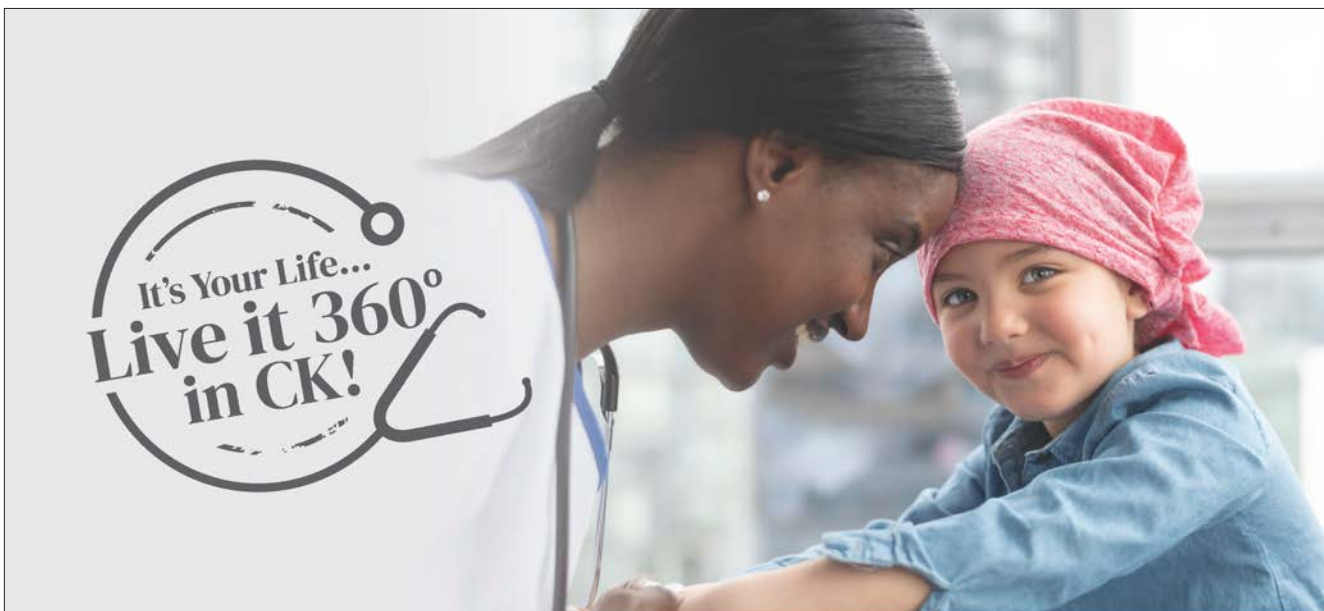


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VOL. 26, No. 2, SPRING 2021 / PRINTEMPS 2021

EDITORIALS / ÉDITORIAUX

- 51 Looking back and looking forward — *Peter Hutten-Czapski, MD*
- 52 Regarder en arrière et droit devant — *Peter Hutten-Czapski, MD*
- 53 President's Message. Striving for excellence in continuing education on indigenous health — *Gabe Woollam, MD, FCFP, FRRMS*
- 54 Message du président. Viser l'excellence en Formation Continue Sur La Santé Autochtone — *Gabe Woollam, MD, FCFP, FRRMS*

ORIGINAL ARTICLES / ARTICLES ORIGINAUX

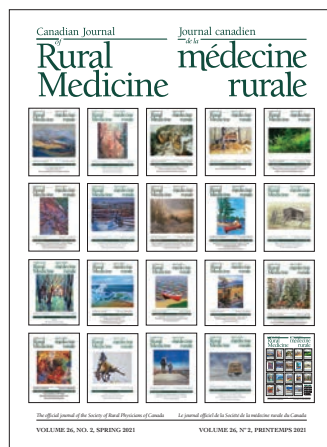
- 55 New obesity treatment: Fasting, exercise and low carb diet - The NOT-FED study — *Terry O'Driscoll, MD, FCFP, Robert Minty, MD, FCFP, Denise Poirier, RPN, Jenna Poirier, BSc, Wilma Hopman, MA, Hannah Willms, B. Arts Sci., Aidan Goertzen, B. Sc, M. Sc, Sharen Madden, MD, M. Sc, FCFP, FRRM, Len Kelly, MD, M. Clin Sci., FCFP, FRRM*
- 61 What makes a healthy rural community? — *Ilona Hale, MD, FCFPC, Stefan Grzybowski, MD, MSc, FCFPC, Zoe Ramdin, PEng*
- 69 Healthcare utilisation among Canadian adults in rural and urban areas – The Canadian Longitudinal Study on Aging — *Kirsten Clark, MD, Philip St. John, MD, Verena Menec, PhD, Denise Cloutier, PhD, Nancy Newall, PhD, Megan O'Connell, PhD, Robert Tate, PhD*

PROCEDURAL ARTICLE

- 80 The occasional eyelid lesion — *Mitchell Crozier, BHK, Sarah M. Giles, BSc, MD*

CASE REPORT

- 87 Survival of Boerhaave syndrome against all odds at a rural Emergency Department — *Mohammed Ibrahim, MD, Janna AbdelAziz, BHSc*



This issue marks the 25th anniversary of the CJRM. The cover represents the last 5 years.

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Looking back and looking forward

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The ancient Greeks had the God Janus who looks back into the past and forward into the future. It is fitting that at this time, the 25th anniversary of the CJRM, 100 issues, and my 13th year as scientific editor, that we reflect on where we have been and where we are going.

John Wootton, our first scientific editor, had the idea to found a medical journal about and for rural medicine. It certainly was an audacious idea in 1994. Rural medicine ... is there such a thing? If there is, are its themes, ideas and concerns not covered in other journals such as the CFP and CMAJ? Can such a Journal find an audience?

Clearly you, dear readers, have answered. We are different and not as lesser representations of our urban-based journals. A rural academic voice is no longer an oxymoron. The CJRM is now (gasp) the established go-to place to publish rurally relevant scholarship.

Into the future, I think we will continue to hold on to that brass ring.

Some things will change (after all, we went virtual in 2010 to become more accessible). Other things grounded in our rural values and perspectives will not. We will continue to encourage new authors (it is a conscious decision that we do not charge for reviewing manuscripts). We will continue to offer our content free of charge.

What we will publish will come from the community. Your interests and your passions will be found in our pages. If it were not for authors having something to say to rural doctors, and in turn the interest in the general community to read about issues relevant to them, we would not exist.

Our pages are for you, both to read and to write. We do not necessarily need a double-blinded study to publish your articles. There are easy entry points such as an opinion piece for our Podium series or writing up a procedure for the Occasional series.

From the Editorial Board, thanks for your on-going support.

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Regarder en arrière et droit devant

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Les habitants de la Grèce antique croyaient au dieu Janus qui se tournait vers le passé et regardait droit devant vers l'avenir. Il est judicieux qu'en ce jubilé d'argent du CJRM, ses 100 numéros, et mes 13 ans à titre d'éditeur scientifique, nous réfléchissions à par où nous sommes passés et là où nous nous dirigeons.

John Wootton, notre premier éditeur scientifique a eu l'idée de fonder une revue scientifique traitant de la médecine rurale à l'intention de ceux et celles qui la pratiquent. C'était certainement une idée audacieuse en 1994. La médecine rurale, est-ce que ça existe vraiment? Dans l'affirmative, les thèmes, idées et problèmes ne sont-ils pas déjà couverts dans d'autres revues comme MFC et JAMC? Une revue de cette nature a-t-elle un lectorat?

Il est clair que vous, très chers lecteurs, avez répondu. Nous sommes différents et non pas du tableau inférieur dont nous peignent les revues urbaines. Un son de cloche scientifique rural n'est plus un oxymoron. Le CJRM est maintenant (sourir) l'endroit établi pour publier les études pertinentes sur le plan rural.

À l'avenir, je pense que nous

allons continuer de jouer ce rôle d'incontournable. Certaines choses vont changer (après tout, nous sommes passés en mode virtuel en 2010 pour être plus accessibles). D'autres, qui prennent racine dans nos valeurs et points de vue ruraux, ne changeront pas. Nous continuerons d'encourager les nouveaux auteurs (nous avons pris la décision délibérée de réviser les manuscrits gratuitement). Notre contenu continuera d'être gratuit.

Ce que nous allons publier proviendra de la communauté. Vos intérêts et vos passions se liront dans nos pages. On n'existerait pas sans les auteurs qui ont quelque chose à dire aux médecins des régions rurales et, en retour, sans la communauté générale qui souhaite se renseigner sur les enjeux qui la concernent.

Nos pages sont à lire et à écrire pour vous. Pour publier, nous n'exigeons pas une étude à double insu. Nous offrons des options plus faciles comme un article d'opinion pour notre série Podium ou la rédaction d'une intervention pour la série Occasional.

De la part du comité de rédaction, nous vous remercions pour votre soutien continu.

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President's Message. Striving for excellence in continuing education on indigenous health

At our fall meeting, the SRPC Council felt strongly that we need to do more as an organisation to improve care for Indigenous patients and communities. This means not only working within our health systems and communities to increase access to services but also making sure that no matter where Indigenous patients have contact with a physician or other health professional, that their experience is safe and respectful, and the care they receive is high quality. Unfortunately, for many Inuit, First Nations and Métis patients and families, this is often not the case.

As an organisation, the SRPC is working to support initiatives that are grounded in anti-racism and that respond, in concrete ways, to the Truth and Reconciliation Commission of Canada (TRC) Calls to Action. One of the strengths of the SRPC has always been in providing high quality, rurally-relevant education for our members. Given this, we are taking some much needed steps to provide our membership with access to knowledge that is critical for providing culturally safe care to Indigenous communities.

Our re-invigorated Indigenous Health Committee has been working to develop an education series. In December 2020, we held an introductory session, 'Moving towards Cultural Safety, Reconciliation, and

Anti-racism' led by Dr. Darlene Kitty along with guest speakers Dr. Nadin Gilroy and Dr. Baijayanta Mukhopadhyay. Over 250 members registered to attend. To me, this is an encouraging sign that we are on the right track.

In the evaluation, participants indicated that they would like more opportunities to learn and engage with clinical and system issues related to Indigenous health, including Indigenous child health, addressing structural racism, and teaching cultural safety. To meet this need, we have planned a series of virtual sessions in the lead up to our annual conference in April, which itself will have an Indigenous health stream.

The SRPC has an important role in addressing the TRC's Calls to Action, particularly those focused on ensuring cultural competency in the education of students and health professionals. For members who are unfamiliar with the 94 Calls to Action, I would encourage you all to visit http://trc.ca/assets/pdf/Calls_to_Action_English2.pdf to familiarise yourself. As physicians in rural Canada, we are leaders in our communities, are influential within our local health systems, and act as educators for the next generation's health professionals. Individually and as an organisation, we have a responsibility to become educated in issues related to Indigenous cultures and health to be useful contributors to reconciliation in Canada.

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Message du président. Viser l'excellence en Formation Continue Sur La Santé Autochtone

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À notre réunion d'automne, le conseil de la SMRC a fortement estimé que notre organisation devrait s'efforcer d'en faire plus pour améliorer les soins auprès des patients et des communautés autochtones. Cela signifie non seulement de travailler dans notre système de santé et dans les communautés pour accroître l'accès aux services, mais aussi de s'assurer que peu importe où a lieu l'interaction entre le patient autochtone et le médecin ou autre professionnel de la santé, l'expérience soit sécuritaire et respectueuse, et les soins dispensés soient de bonne qualité. Malheureusement, pour de nombreux patients inuits, des Premières Nations et métis, ce n'est souvent pas le cas.

À titre d'organisation, la SMRC appuie les initiatives à fondements antiracistes et qui répondent concrètement aux appels à l'action de la Commission de vérité et réconciliation du Canada (CVR). L'une des choses auxquelles la SMRC excelle est de constamment fournir à ses membres une formation de bonne qualité et pertinente sur le plan rural. Vu ce qui précède, nous prenons les mesures nécessaires pour donner à nos membres accès aux connaissances essentielles pour dispenser des soins culturellement sécuritaires à nos communautés autochtones.

Dynamisé, notre Comité sur la santé autochtone élabore une série de formation. En décembre 2020, nous avons tenu une séance préliminaire intitulée "Moving Towards Cultural Safety, Reconciliation, and Anti-racism" qui était animée par la D^{re} Darlene

Kitty avec les conférenciers invités D^{re} Nadin Gilroy et D^r Baijayanta Mukhopadhyay. Plus de 250 membres s'y sont inscrits. À mes yeux, il s'agit là d'un signe encourageant que nous sommes sur la bonne voie.

À l'évaluation, les participants ont indiqué souhaiter avoir plus d'occasions d'apprendre sur les enjeux cliniques et systémiques liés à la santé autochtone, y compris la santé des enfants autochtones, le racisme structurel et l'enseignement de la sécurité culturelle et de s'y engager. Pour répondre à ce besoin, nous avons prévu une série de séances virtuelles avant notre conférence annuelle d'avril, qui elle aussi comptera un volet sur la santé autochtone.

La SMRC joue un rôle important pour répondre aux appels à l'action de la CVR, surtout pour les personnes qui assurent la compétence culturelle durant la formation des étudiants et des professionnels de la santé. Pour nos membres qui ne connaissent pas les 94 appels à l'action, je vous encourage à visiter le site http://trc.ca/assets/pdf/Calls_to_Action_French.pdf pour vous y familiariser. titre de médecins qui pratiquent dans les régions rurales du Canada, nous sommes les leaders de notre communauté, nous sommes influents au sein de notre système local de santé, et nous sommes les éducateurs de la prochaine génération de professionnels de la santé. Individuellement et à titre d'organisation, nous avons la responsabilité de nous renseigner sur les enjeux liés aux cultures et à la santé autochtones afin de contribuer utilement à la réconciliation au Canada.

New obesity treatment: Fasting, exercise and low carb diet - The NOT-FED study

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Abstract

Introduction: Due to high rates of obesity in Canada, weight loss is an important primary care challenge. Recent innovations in strategies include intermittent fasting and low-carbohydrate diets, with limited research in a rural setting.

Methods: This prospective 1-year observational study provided patients in Sioux Lookout, Northwestern Ontario with information on fasting and low-carbohydrate diets. Patients were recommended to attend every 3 months for measurements of weight, waist circumference, body mass index (BMI) and blood pressure. Initial and 6-month bloodwork included A1c and Lipids. A survey of health status and diet was administered at 6 months.

Results: Of the 94 initial registrants, 36 participants completed 1 year and achieved a 9% weight loss and an 8.6% decrease in BMI and waist circumference. Most participants were female with an average age of 60 years. Clinically insignificant changes in blood pressure and serology were observed. Participants reported few side effects and good compliance with intermittent fasting, averaging 15 h/day, 6 days/week. As in other dietary studies, the dropout rate was high at 62%.

Conclusion: This low-resource initiative was successful in assisting self-selected patients at a rural primary care clinic to achieve significant weight loss at 1-year. This approach is practical and is fertile ground for ongoing research.

Keywords: Diabetes, intermittent fasting, low carbohydrate diets, obesity, rural

Résumé

Introduction: En raison du taux élevé d'obésité au Canada, la perte pondérale est un énorme défi en première ligne. Les récentes innovations stratégiques incluent le jeûne intermittent et les régimes faibles en glucides, qui ont fait l'objet de peu de recherche dans les contextes ruraux.

Méthodologie: Cette étude prospective d'observation d'un an a fourni aux patients de Sioux Lookout, du Nord-Ouest de l'Ontario de l'information sur le jeûne et les régimes faibles en glucides. On recommandait aux patients de se présenter tous les 3 mois pour mesurer le poids, le tour de taille, l'IMC et la tension artérielle. Les analyses sanguines initiales et à 6 mois compaient les taux d'HbA1C et de lipides. Un sondage sur l'état de santé et le régime alimentaire était administré à 6 mois.

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Résultats: Sur les 94 personnes initialement inscrites, 36 participants ont terminé l'étude d'un an et ont perdu 9 % de leur poids et ont réduit l'IMC et le tour de taille de 8,6 %. La plupart des participants étaient de sexe féminin et l'âge moyen était de 60 ans. Des variations significatives sur le plan clinique de la tension artérielle et de la sérologie ont été observées. Les participants ont signalé peu d'effets indésirables et ont bien observé le jeûne intermittent, en moyenne pendant 15 heures/jour, 6 jours sur 7. Tout comme dans les autres études sur les régimes alimentaires, le taux d'abandons était élevé, à 62 %.

Conclusion: Cette initiative nécessitant peu de ressources a réussi à aider les patients volontaires recrutés dans une clinique rurale de première ligne à perdre significativement de poids à un an. Cette approche est pratique et est un terreau fertile pour la recherche qui continue.

Mots-clés: diabète, obésité, régimes faibles en glucides, jeûne intermittent

INTRODUCTION

Over 63% of adult Canadians were overweight (27%) or obese (36%) in 2018.¹ As an independent risk factor for diabetes, hypertension and cardiovascular disease, obesity is an important primary care challenge, particularly in rural communities: the age group with the highest prevalence of obesity in Canada are boys living in towns with a population under 20,000.²⁻⁶ Apart from disease modification, weight loss is a common patient goal for self-esteem, increased mobility and improved quality of life.

There are few successful strategies that physicians can recommend. Calorie-reduced diets typically lead to limited short-term weight loss. The Women's Health Initiative, a large observational study of over 40,000 postmenopausal women, disappointingly demonstrated that calorie restriction combined with increased exercise failed to produce significant weight loss or improved metabolic profiles.^{4,5} Recent health and weight loss strategies include intermittent fasting and low carbohydrate diets.^{7,8} This approach is informed by an 'endocrine theory of obesity', with a focus on insulin. There is a lower insulin response to fat or protein consumption than to carbohydrates.⁹ Lower insulin levels decrease fat storage and allow its mobilisation by gluconeogenesis, with a resultant weight loss, accompanied by a clinically insignificant ketosis ('ketogenic').^{9,10} The focus is on lowering 'carbs' rather than calories [Figure 1].

The purpose of this study was to measure the effect of a primary care initiative combining fasting, low carbohydrate diet and exercise recommendations in a rural community.

METHODS

Study design

This prospective, patient-managed initiative measured weight loss, quality-of-life indicators and metabolic risk factors in self-referred patients in a rural primary care practice. The setting was the town of Sioux Lookout in NW Ontario, with a population of 5000.

Participants were self-referred adults (18+) interested in weight loss who were offered weight loss information, baseline measurements and a 3-monthly follow-up. Patients with diabetes

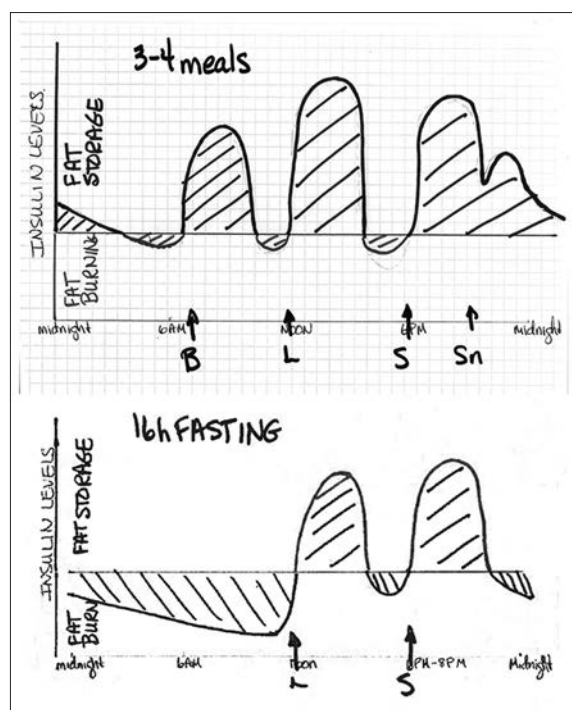


Figure 1: Community poster indicating theoretical insulin and metabolism response to 3-4 meals per day versus overnight and morning fasting and lunch and supper meals. L = lunch; S = supper.

were eligible if they were not taking or could safely discontinue medications associated with hypoglycaemia (e.g., insulin and sulphonylureas) for a 3-month period. Frail or medically unstable patients were excluded. Patients were initially engaged by a physician or nurse at registration; compliance with follow-up attendance at the recommended 3-monthly follow-up was left to patients. There was some limited 'reminder' telephone support in the early months of the study.

We gave general advice about lowering carbohydrates. Patients decided on their own specific approach including Mediterranean, paleo and ketogenic diets, all of which have decreased carbohydrate content.

The fasting and dietary recommendations included 'intermittent fasting' (a daily 16-h fast), for up to 7 days/week. We recommended the 16-h daily fast and *ad libitum* low-carb consumption.

A low carbohydrate diet was described as eliminating simple sugars and processed foods and minimising other common carbohydrates in our diet: potatoes, pasta and bread. Participants chose their dietary macronutrient balance, by either increasing their fat or protein consumption. Online and written resources for 'low-carb diets' and intermittent fasting were supplied in an orientation package (available at: hughallenclinic.com). Exercise recommendation mirrored the standard General Physical Activity Guidelines of 150 min of moderate exercise per week.¹¹ Information posters were placed at the clinic, library and other public bulletin boards.

Variables

Anthropometric variables including weight, height, waist circumference and blood pressure were recommended at 3-month intervals and measured by clinic nursing staff. Serology assessments of A1C and lipids occurred at baseline and at 6 months. Self-reported quality of life surveys were offered at the 6-month clinic visit, identifying initial and present health status, dietary and lifestyle changes and adverse events.

Statistical analysis

This was an open-ended patient-led observational initiative, with recommended dietary and fasting interventions. Patients joined at individual starts

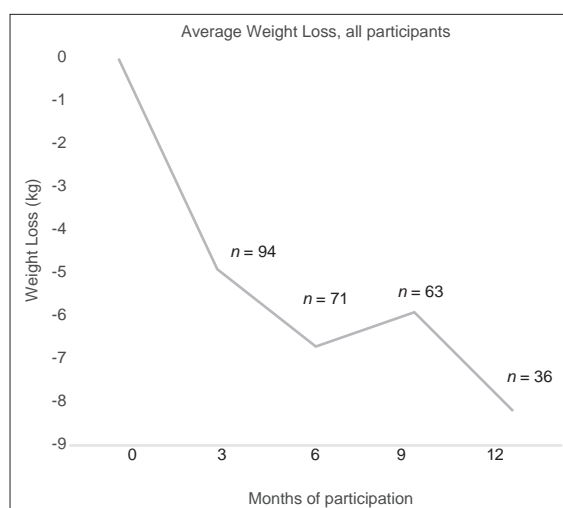


Figure 2: Weight loss for all participants at 3-monthly intervals.

Table 1: Initial and 12-month measurements (n=36)

| | Baseline | 12 months | P |
|-------------------------|------------|------------|--------|
| Weight, kg | 92.5±17.76 | 84.3±15.60 | 0.0411 |
| BMI, kg/m ² | 35.3±6.14 | 32.2±5.6 | 0.0284 |
| Waist circumference, cm | 113±14.20 | 103.7±14.5 | 0.0076 |
| Systolic BP | 142±15.6 | 139±18.27 | 0.4562 |
| Diastolic BP | 82±5.3 | 81±5.38 | 0.7534 |

BP: Blood pressure, BMI: Body mass index

Table 2: Initial and 6-month laboratory results (n=24/36)

| | Baseline | 6 months | P |
|--------------|----------|----------|--------|
| A1C, % | 5.8±0.78 | 5.5±0.49 | 0.0547 |
| HDL (mmol/L) | 1.4±0.49 | 1.4±0.45 | 1.00 |
| LDL (mmol/L) | 3.1±0.94 | 3.4±1.10 | 0.2176 |
| TC (mmol/L) | 5.2±1.01 | 5.4±1.27 | 0.4621 |
| TG (mmol/L) | 1.6±0.69 | 1.3±0.70 | 0.0713 |

HDL: High-density lipoprotein, LDL: Low-density lipoprotein, TC: Total cholesterol, TG: Triglycerides

over a 2-year period, 1 April 2017–1 April 2019 and data collection ended on 1 October 2019. All variables were analysed for those in the 12-month cohort. Weight measurements were recorded for all participants, including those who participated for <1 year. Self-reported 6-month health status and dietary changes were analysed using 3-or 5-point Likert scales. Data are presented as the mean and standard deviation for continuous variables and proportions for discrete variables. Ethics was approved by the Sioux Lookout Meno Ya Win Health Centre Research Review and Ethics Committee.

Table 3: Self-reported health status at 6 months (n=13/36)

| Health status (%) | Excellent | Very good | Good | Fair | Poor |
|-------------------|-----------|-----------|---------|------|------|
| Baseline | 0 | 2 (15) | 11 (85) | 0 | 0 |
| 6 months | 4 (31) | 7 (54) | 2 (15) | 0 | 0 |

Table 4: Self-reported dietary changes at 6-months (n=13/36)

| Percentage participants with dietary change | Increased | Unchanged | Decreased |
|---|-----------|-----------|-----------|
| Fat | 6 (46) | 3 (23) | 4 (31) |
| Protein | 9 (69) | 4 (31) | 0 |
| Carbohydrate | 0 | 0 | 13 (100) |

RESULTS

Of the 94 initial registrants, 36 participants completed 12 months. This 12-month cohort was primarily female (34/36) with an average age of 60 years [Table 1]. Many received anti-hypertension medications (16/36), 5 received statin and 8 metformin.

The 12-month participants experienced an average weight loss of 8.2 kg (9% decrease). Body mass index and waist circumference decreased by 8.6% [Figure 2]. Blood pressure, lipids and A1c underwent clinically insignificant changes in 24 of the 36 participants [Tables 2 and 3]. Short-term participants also experienced a 4.9 and 6.7 kg weight loss at 3 and 6 months, respectively [Figure 2]. The dropout rate was 62% (58/94).

The 6-month self-report health survey was completed by 13 participants. Most (10/13) maintained their previous level of exercise and reported improved health status [Table 4]. Self-reported fasting compliance was high at 6 months: participants fasted an average of 15 h/day, on an average of 6.3 days/week. More patients lowered their carbohydrate by increasing protein versus fat consumption [Table 4]. Few side effects were reported; there were several reports of constipation or headache and no episodes of hypoglycaemia.

All weight-loss discussions and clinical surveillance occurred without any increase in staffing/hours and took place during a typical clinic day.

DISCUSSION

Rural populations have lower socioeconomic status, access to recreational facilities and dietary support

services than urban centres.^{6,12,13} We demonstrated that a 'low resource' intervention is possible in a busy rural practice to facilitate weight loss.

The combination of intermittent fasting and a low carbohydrate diet was effective in achieving a 9% 1-year weight loss in 36 participants in a busy rural clinic. This level of weight loss is equivalent to other more resource-intense dietary studies but had none of the standard components for successful recruiting and retention (e.g., financial incentives, meal replacements).^{14,15} The dropout rate of 62% is high but is similar to other dietary studies.¹⁵ There was no increase in staffing/hours due to weight loss discussions and clinical surveillance. Patients were largely healthy and self-selected. We chose the combination of intermittent fasting and a carbohydrate reduced diet as there was good supporting evidence and several authors had achieved weight loss using these two strategies.^{6,7,15}

The typical Canadian diet contains 48% of caloric intake from carbohydrates; 'low-carb' generally refers to a reduction to <40% and a 'very low-carb' restriction (ketogenic) to <30%.^{16,17} Cochrane reviews in 2018 and 2019 show low carbohydrate diets to be effective for weight loss.^{18,19} Patients in our study had strong preferences regarding increasing either protein or fat in their diet, the consumption of animal versus plant protein and consumption of saturated versus unsaturated fat.

Intermittent fasting commonly consists of a daily fasting period of 16 h (e. g. 8 pm to noon), or two 24-h fast periods per week ('5:2').⁶ Another format is 'alternate day fasting' where caloric intake is restricted to 500–600 kcal/day every second day, followed by a feast day.⁶ A recent literature review of 27 studies of intermittent fasting

documented that weight loss was equivalent to calorie-restricted diets.²⁰ Our recommended 16-h daily fast and *ad libitum* low-carb consumption could be gradually introduced and seemed more tolerable, an important concern for new initiates to fasting.

Several recent studies combined intermittent fasting and a low-carb diet.^{10,14-16} Kalam *et al.* combined alternate day fasting and a calorie-restricted ketogenic diet over 6 months. Thirty-one participants had an average weight loss of 6.3 kg. With a dropout rate of 62%.¹⁵ Extensive resources were dedicated to follow up and meals were provided. Five other studies of 12–36-week duration combined intermittent fasting and a low-carbohydrate diet. They all demonstrated a 5%–10% weight loss among their study participants ($n = 26$ –244).²¹⁻²⁵

Most of the 13 participants completing the 6-month health survey described improved health status, although none reported ‘poor’ or ‘fair’ initial health. Their macronutrient changes included an increase in protein more frequently than increased fat consumption. Similar to other low-carb diets, serology testing showed minimal changes and was accompanied by a small decrease in systolic and increase in diastolic blood pressure.^{9,21-26}

Our study was not designed to improve glycaemic control; only 8 patients using metformin were enrolled. The slight drop in A1C (0.3%) among the 13 participants at 6 months was from a normal baseline of 5.8% but suggests that this strategy may be useful for patients with diabetes, which would require a study with more rigorous education and clinical supervision.²⁷ Exercise is not known to effect weight loss but was included in our recommendations to promote a healthy lifestyle.²⁸⁻³⁰ The majority of patients (75%) maintained their self-reported prior level of exercise. One barrier to a low-carbohydrate diet may be financial; many approaches increase food costs and that may be a limitation for many rural families.³¹

One of the unforeseen and perhaps most significant benefits of the study was the community effect. Study information spread by word of mouth and became a common topic of discussion around town. Posters were up in the library and clinic. The initiative created an atmosphere for thoughtfulness and discussions around healthy eating and wellness, both for patients and health-care providers. It was

easily integrated into the care of clinic patients, providing an opportunity to address weight loss. Interested patients could either ‘check with the nurse on your way out’ or visit the clinic website for study information. This focus on what we eat and how we live has had a positive community effect. Not only has this weight loss initiative energised Sioux Lookout community members, it has also been adopted by several other rural communities in Alberta, Manitoba and Ontario. The level of evidence even if reproduced in other rural communities will remain limited. A prominent American diabetes researcher commented on the state of low-carbohydrate diet research: ‘Given the current state of research funding and the palpable bias against low-carbohydrate approaches, it is unlikely that an RCT can be performed that will satisfy everybody. The seriousness of diabetes suggests that we have enough evidence of different types to re-evaluate our current recommendations for treatment’.²⁷

Limitations

There are notable limitations in this study. It is a small study of self-selected participants. Inconsistent attendance of participants was a barrier, creating gaps in the data. Our study recommended a low-carbohydrate approach but did not quantify or measure actual dietary intake and had no direct measure of ‘carb-content’.

We relied on self-reports of health status and dietary changes and a self-selection bias is inherent in this healthy cohort of participants. Recall bias may exist for baseline health status which was reported retrospectively in the 6-month survey. While a more rigorous follow-up would have resulted in better participant retention, choosing to proceed with our existing resources made the initiative possible.

CONCLUSION

The combination of intermittent fasting and a low carbohydrate diet promoted meaningful weight loss among a self-selected population in a rural primary care clinic. The initiative promoted community awareness of healthy living. This low-resource approach is a practical intervention for motivated patients interested in weight loss and is deserving of further consideration and investigation.

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What makes a healthy rural community?

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Abstract

Introduction: Health outcomes in rural populations are known to be generally worse than in urban populations but there are some exceptions to this trend. Most research evaluating these disparities has focused on rural communities with poor health outcomes. The current study set out to explore the factors that make some rural communities healthier than others.

Methods: Semi-structured interviews were conducted with a purposive sample of 12 key informants in a rural community within a healthy outlier region. The interview guide was based on the Social-Ecological Model of health and the focus was on community – as opposed to facility-based health. Interview data were analysed using directed content analysis.

Results: Five main themes were identified: (1) availability of amenities, (2) healthy lifestyle as a shared value, (3) transition from a mining community, (4) geographic location and (5) challenges.

Conclusion: Many of the findings challenge traditional assumptions about determinants of health in rural communities. The phenomenon of ‘amenity migration’ from urban to rural areas which may increase in coming years, is one that can have important implications for health.

Keywords: Community, health, rural

Résumé

Introduction: On sait que les résultats de santé dans les populations rurales sont en général moins favorables que dans les populations urbaines, mais il y a des exceptions. La plupart des recherches s’étant penchées sur ces disparités se sont concentrées sur les communautés rurales ayant de piètres résultats de santé. L’étude actuelle explore les facteurs qui font que certaines communautés sont en meilleure santé que d’autres.

Méthodologie: Des entrevues semi-structurées ont été réalisées auprès d’un échantillon intentionnel de 12 principaux intervenants dans une communauté rurale d’une région banlieusarde en bonne santé. Le guide d’entrevue, basé sur le modèle socio-écologique de la santé, se concentrait sur la santé en communauté – plutôt qu’en établissement. Les données de l’entrevue ont été analysées à l’aide d’une analyse du contenu dirigé.

Résultats: Cinq thèmes principaux sont ressortis: 1) disponibilité des services, 2) valeur partagée de mode de vie sain, 3) transition d’une communauté minière, 4) emplacement géographique et 5) défis.

Conclusion: Nombreuses sont les observations qui remettent en question les suppositions traditionnelles sur les déterminants de la santé dans les communautés

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rurales. Le phénomène de « migration des services » des régions urbaines aux régions rurales, qui pourrait s'intensifier dans les prochaines années, pourrait avoir des répercussions importantes sur la santé.

Mots-clés: rural, communauté, santé

INTRODUCTION

Rural population health outcomes have repeatedly been shown to be worse than outcomes for populations in urban settings.¹⁻⁵ The reasons for these persistent disparities are unclear. Differences in social determinants of health (Socioeconomic status, education level), health behaviours (smoking, diet, physical fitness) and risk exposure (rural work and recreational activities) are some of the potential contributors.

In Canada, this is an important issue given that 19% to 38% of the population is defined as rural.^{6,7} However, there are some rural areas that do not follow this trend. The target community for this study, Kimberley, BC, lies within one of these relatively healthy rural regions of British Columbia (BC), Canada (the Kootenays, in the southeast corner of the province). The health outcomes for this population are comparable to urban outcomes.⁸ Most research looking at rural/urban health disparities has focused on examining the many challenges faced by communities with very poor health outcomes. Examining a community within a 'healthy outlier' region may provide additional insight into the relationship between rurality and health. In this study, we aim to answer the question: 'What do key community leaders in Kimberley BC believe are the factors that support or undermine the health of the individuals in their community and what do they feel are some opportunities for improvement?'

METHODS

Design and setting

This is a qualitative study using individual key informant interviews. We conducted the study in the target community of Kimberley, BC.

Population

Members of the research team and the community partner, the Healthy Kimberley Society, identified

a purposive sample of key informants and used snowball sampling techniques to expand the pool of potential participants. To ensure the greatest representation of views from all sectors of the community we made efforts to enrol key informants representing different age groups, professions, socioeconomic and special interest groups. Our particular focus was on individuals representing disadvantaged or hard-to-reach groups that may be under-represented during usual engagement processes. We anticipated that a sample size of 8-12 interviewees would be adequate.

Data collection

The interviews were conducted in person by members of the research team which included 2 family physicians (IH and SG) and a research assistant employed by Healthy Kimberley (ZR). Two of the interviewers (IH, ZR) are long-term residents of the target community.

We developed the semi-structured interview guide using the Social-Ecological Model (SEM) of health, a 'theory-based framework for understanding the multifaceted and interactive effects of personal and environmental factors that determine behaviours and for identifying behavioural and organizational leverage points and intermediaries for health promotion'.⁹ We focused the interviews on community-as opposed to facility-based health issues. Interviews lasted 30-60 min and were audio-recorded. The interview team made field notes during and after each interview to capture key points and important reflections to assist in analysis. Each participant received an honorarium of a \$50 gift card.

Data management and analysis

We assigned each participant a unique study number. As the interviews were completed and transcribed, they were reviewed by 2 team members (IH, ZR) using directed content analysis with key concepts from the SEM as initial codes. Each reviewer read through

several initial transcripts identifying specific concepts that aligned with the initial code list and new ideas that emerged from the text. The coders met to discuss their findings and to agree upon a number of codes, themes and sub-themes that were used to code the remainder of the transcripts, while maintaining some flexibility to introduce new codes if needed. We used Nvivo12 software to assist with the analysis. Reporting of the results follows Consolidated Criteria for Reporting Qualitative Research guidelines.¹⁰

Ethics

This study has received ethical approval through a joint review from the University of British Columbia Research Ethics Board and the BC Interior Health Research Ethics Board.

RESULTS

The participants included 12 community leaders representing different groups [Table 1]. Participants identified four major themes: (1) the many amenities available that support recreation, (2) health as a shared community value among residents; (3) the transition from mining to tourism economy and (4) geographic location.

Table 1: Participant demographics

| Characteristic | n (%) |
|----------------------------|--------|
| Gender | |
| Female | 7 (58) |
| Male | 5 (42) |
| Age (years) | |
| 31-40 | 1 (8) |
| 41-50 | 2 (17) |
| 51-60 | 7 (58) |
| >60 | 2 (17) |
| Education | |
| Grade 12 | 1 (8) |
| College | 3 (25) |
| University | 8 (67) |
| Occupation* | |
| Private business | 3 (25) |
| Not for profit | 4 (33) |
| Government | 2 (17) |
| Government-health | 5 (25) |
| Government-education | 5 (42) |
| Government-law enforcement | 1 (8) |
| Other | 1 (8) |

*Some participants had more than one occupation

Despite the generally positive responses, some challenges were identified, particularly in relation to certain vulnerable populations. Representative quotes are included in Table 2.

Availability of amenities

Most participants began with descriptions of the many outstanding recreational amenities and programs available in the community. Some challenges were also identified such as costs of activities, under-utilisation and lack of coordination of existing facilities and activities [Table 2].

Healthy lifestyle as a shared community value

Without exception, participants described what they felt was an unusually healthy population and culture in Kimberley [Table 2]. They reported a welcoming atmosphere that reflects people's desire to simply be active and a sense of pride in this aspect of the community. Participants reported that this attitude promotes inclusion and reduces barriers to participation with residents being happy to share the town they love with like-minded newcomers.

Several participants recognised the positive feedback loop that happens when enough people in a community share healthy values. This influences the development and maintenance of infrastructure and programs through fundraising, volunteering, supporting businesses that cater to health-conscious consumers and election of like-minded local officials. This in turn attracts more similar people who contribute to maintaining the culture. The active, healthy mindset has become part of the community brand which brings more businesses and newcomers who are attracted to the image.

Transition from a mining community

With the closure of the 100-year-old mine in 2001, there was a deliberate decision to transition to a tourism economy, laying the foundation for the current lifestyle community. Interviewees who were here during the mining era reported that there were many unhealthy activities and values associated with being a mining town: more of a 'drinking culture' (P11), more motorised and less active recreation, more pollution and less concern for the environment [Table 2].

There have also been some negative aspects associated with this transition [Table 2]. The

Table 2: Quotes from participants

| Theme | Participant quote |
|--|---|
| Availability of amenities | <p>'Things are accessible. Like athletic trails, pools, safe streets, safe community' (P1)</p> <p>'Open space in parks and having facilities available for our population, encouraging biking, walking around town and having a focus on nonmotorized ways of moving' (P4)</p> <p>'Having all of those hundreds and hundreds, thousands of acres of land available for humans to use allows us to have peace of mind. That's a mental health issue, I think' (P7)</p> |
| 1. Healthy lifestyle as a shared community value | <p>'People seem to have that mental attitude. This is the healthiest most active community that I've been in and I think the whole culture, it's got that vibe' (P9)</p> <p>'Nobody's out there just sitting around talking about doing stuff. They're actually outside doing it' (P2)</p> <p>'I found the people who grew up here to be the most welcoming of people - the new people in town, are learning. I think that they want to share those same values. I think, there are great values that the people who have created this legacy of Kimberley, have created for us' (P11)</p> <p>'The role models, it's pretty inspiring to live in this community' (P2)</p> <p>'People move here for the lifestyle and then it just builds' (P9)</p> <p>'We've got to the stage where it almost kind of just runs itself' (P9)</p> <p>'When I go to other communities, I can't find healthy places to eat. It's easy to find it here. It's everywhere you go' (P5)</p> <p>'The focus just seems more on healthy lifestyle than it does about economy and industry. I think that's reflected in stuff that comes down from local leaders' (P3)</p> <p>'Why are you coming here? We have no housing, we have no jobs' They're all saying lifestyle, lifestyle, lifestyle'</p> |
| 2. Transition from mining community | <p>'It's not, drinking-your-face-off-till-three-in-the-morning-mentality, anymore' (P9)</p> <p>'I would say it was the mine closing. Alcohol was a lot more predominant (and) we had a huge forest industry and I think, they came home and they drank. They didn't go for a bike ride. They just finished working 12 h on the end of a chainsaw, what do they want to go for a bike ride for? They want a beer' (P9)</p> <p>When I grew up here we had four bars and two pubs, we had the Legion and the Elks and then the bars where people can go out. So there was a lot more drinking. We've had more drugs and everything than we do now' (P1)</p> <p>'Kimberley doesn't have a bar' (P11)</p> <p>'When I was a kid, we were not allowed to go within a hundred feet of Mark Creek: it was considered very dangerous and toxic. Now kids are fishing in Mark Creek' (P7)</p> <p>'We have service industry jobs here. They're \$15 an hour jobs. You can't raise kids on 40 grand a year' (P10)</p> |
| 3. Geographic location | <p>'We're not on a major highway and that has a tremendous impact on the number of people and the type of person that in fact comes here. Nobody comes to Kimberley by accident' (P10)</p> <p>We don't have the homeless problem, because not being on the highway, so we don't tend to get that type of clientele' (P9)</p> <p>'You don't get 100 trucks going through an hour like you do in (other communities)' (P10)</p> <p>We only have two chain franchises, for restaurants (P11)</p> <p>Those that are transient, don't land here because it's not on the main road. We don't have that in Kimberley' (P9)</p> <p>'What happens is that segment of the population doesn't stay here because they don't have (the government social service offices) and so typically, they don't have a car. Two or three hundred of them migrate to Cranbrook because they can't manage up here. That brings our healthy average up' (P9)</p> <p>'We've got this symbiotic relationship going on with Cranbrook in many, many ways' (P10)</p> <p>'We are here 30 km away from Cranbrook - our fastest growing part of the population is people working in Cranbrook that want to live in Kimberley' (P10)</p> |
| 4. Challenges | <p>'It's a huge stressor right now. There are so many families moving to our community' (P8)</p> <p>'There is becoming a huge gap, between those that can and those that cannot to do all that kind of stuff. Then those that don't do anything in the last couple of years I've noticed that' (P8)</p> <p>'They're struggling financially, or they need a support system because they struggle with parenting skills' (P9)</p> <p>'If moms are feeling overburdened and overworked, and they wanna get back to work but they can't that stress gets on them' (P8)</p> <p>'Even though Kimberley is growing we're losing lots too because (they) could not afford it here. And I think that's a quiet, invisible caravan that no one's seeing, or reporting, or talking about. They just go' (P10)</p> |

Contd...

Table 2: Contd...

| Theme | Participant quote |
|-------|---|
| | 'If you have a shut-in elderly man still living at home they don't know how to shop, cook and then there's two feet of snow on the ground they're having a hard time getting around' (P7) |
| | 'They (seniors) are losing that connection with their churches because there's no transportation on a Sunday' (P1) |

switch from secure, high-paying industry jobs to a tourism economy which provides mostly low-paying, seasonal and out-of-town or contract jobs has been a challenge for many people. The growing recognition of Kimberley as a 'good place to be' is attracting people from larger centres all over the country and even from other resort towns, driving house prices up and making it increasingly difficult for local families or lower income would-be residents to find affordable housing. The large influx of young families has also created a childcare crisis, preventing many parents from returning to work.

The loss of the major industry has also had a major impact on the municipal tax base leaving the city with far less money available for 'extras' like recreation programs.

Some people expressed a concern that newcomers, especially tourists and temporary residents, may not feel as connected and invested in the community and may want to just take what the community has to offer and not 'give back' in the same way that long-time local or permanent residents may do.

Geographic location

The unique geographic location of the community was mentioned by several participants as an important factor that has implications for the health of the community [Table 2].

Its location on a trunk road rather than a major thoroughfare results in little through traffic, few fast food outlets and few transients; people arrive here deliberately, creating a community of people who are here by choice.

Its proximity to a relatively major population centre (Cranbrook –30 km away) provides easy access to important amenities like jobs, which allows people to work in the city but continue to enjoy the recreational amenities and slower-paced, quiet life of the small town. Also available in the city, for those who want them, are the big box stores and fast food outlets, again, obviating

the need for these services to be available in the target community. Many government offices and services, a regional hospital, homeless shelters and support for people who require social services are located in Cranbrook so people who require those services, because of the limited transportation options between the two communities, frequently relocate from Kimberley to Cranbrook 'making our healthy average go up'. (P9)

At the same time, the distance from the nearest very large metropolitan centre (Calgary – 5 h away through the mountains), is just slightly too far to make it a convenient weekend getaway place for second homes. This appears to have resulted in relatively few second home owners compared to other neighbouring towns. The proximity to mountains, lakes and rivers, although not unique, certainly has an impact on the amenities available.

Finally, Kimberley is situated where it is because of the historical location of the mine, not because 'the rivers join here' (P7) and consequently the indigenous population is relatively small.

Challenges

There were a number of observations made by participants about the needs of vulnerable populations in the community [Table 2].

Children and youth

Many of the challenges reported to be emerging for children and youth are not unique to this community or the transition economy but rather a reflection of larger societal changes such as increasing mental health problems, use of 'vapes', more screen time, less unstructured physical activity, less healthy eating habits, more focus on expensive, structured, competitive activities.

People with disabilities/elderly

Several participants mentioned the lack of adequate transportation options for those

relying on public transport, particularly during winter, evenings and weekends. One participant reported that there was previously a well-functioning volunteer committee to address accessibility issues. Social isolation was reported to be a problem for many seniors, particularly in winter.

Food security/healthy food

Although there are several programs to increase food security such as the food bank and school food programs, concerns were raised about their ability to meet the nutritional needs of users and not following current best practices and guidelines. The new food recovery depot is addressing some of these gaps.

DISCUSSION

Several key factors appear to contribute to health in Kimberley: an abundance of recreational amenities, a health-oriented culture, a shift from resource-extraction to tourism and its geographical location. Several findings in this study challenged widely held assumptions about health in rural communities.

Contrary to the traditional understanding that rural communities are less healthy than urban communities, many of our findings suggested that it is specifically the characteristics of this small rural community that contribute to a sense of greater health and that people deliberately choose to move from urban areas with the intention of becoming healthier.

Models that attempt to describe community factors influencing health such as the Social-Ecological Model or the Public Health Agency of Canada Health Determinants model typically emphasise how the many different layers of external influence can impact the health of the individual. Participants in this study frequently reported that in this community, it appears to be the inherent qualities of the individuals who choose to live in the community that lead them to be active and healthy. These individuals appear to drive the demand for increased availability of healthy programs, services and facilities, which in turn attracts more like-minded people to the community and consequently influences the direction of local political decisions, investments and community

branding, all contributing to a culture of healthy living. This results in a self-perpetuating process with the healthy community image attracting more and more newcomers who share the same values and also influences others in the community who come to accept this healthy culture as the norm while decreasing the availability/ease of access to unhealthy options such as fast food. This model suggests that, although the relationships between levels of influence are necessarily reciprocal, the mindset of the individual community members is a key determinant of the health of the community. It helps explain the common observation that implementing programs and building recreational infrastructure in some communities often fails to have the desired result in terms of both uptake and sustainability. If citizens do not value healthy lifestyles, even 'if you build it', they will not necessarily come and even if they do, programs will not be sustainable without perpetual external input.

The importance of individual community members' existing mindset in influencing the health of a community as observed in Kimberley might suggest that it would be difficult to replicate many of the healthy aspects of this community elsewhere. If another community worked to generate a healthy image or brand to attract more healthy people it might only serve to shift healthy people from one place and concentrate them in another, leaving the overall balance of 'health' in the province or region unchanged. But the factors that influence the development of a healthy mindset are complex and although it may appear that these attitudes are relatively fixed, strongly influenced by early life exposures and primarily found in certain socioeconomic or cultural groups, it is important to continue to explore which factors might foster the development of healthier mindsets even at later stages in life among people of all different backgrounds.

Although 'culture' is frequently mentioned as a determinant of health, this community appears to be essentially defined by its culture of health. The relative homogeneity of Kimberley, with respect to the shared healthy values, socioeconomic levels and the racial and ethnic composition may be significant.

Comparison of the situation before and after the closure of the mine acts as a sort of unique comparison in this study with a change in one key

variable over time, from resource extraction to tourism community. Many of the participants were present both before and after the mine closure and were able to report on the differences. This provides an interesting opportunity to better understand the association between different factors influencing health with the geographic location as a constant. Before the mine closure, wages were reported to be higher, recreational facilities were freely available, provided by the mining company or the City, many families were single income with one parent at home and yet residents who were here at the time report that the lifestyle was less healthy. This challenges the common assumption that over time, we are all becoming less healthy with more fast food, more stress, more modern conveniences, screen time and less activity. It also contrasts with the commonly held assumption that higher wages result in improved health and supports the theory that it is the mindset or values of the residents that plays the greatest role in the overall health of a community.

Research examining the community-level health impacts of resource extraction industries has identified a number of important factors including both direct occupational and environmental effects on workers as well as negative influences on social determinants of health such as large wage disparities, gender inequality, inadequate housing and job insecurity due to the boom and bust cycle of resource commodities.^{11,12} When workers come to a community for the sole purpose of work, particularly when their true 'home' is elsewhere, it can result in a lack of sense of community and social connectedness, boredom, increased crime, sexually transmitted disease and substance use. When the community's economy is based solely on extracting the natural resources from an area the relationship between residents and their environment is one of 'mastering' or 'taking from' their environment. The natural resources are perceived to exist solely to be exploited and the community is sustained only until the resource has been depleted.

The transition from a resource extraction community to a lifestyle community has been well-described in the literature on 'amenity migration' for many years, especially in the American West, dating back to the 1970s. Many of the observations in our study are consistent with this phenomenon. Amenity migration is

defined as the movement of people based on the natural and/or cultural amenities of a place. Rural areas previously valued for natural resources become increasingly valued for aesthetic and recreational amenities.¹³ There is little mention in the literature about the impacts of this trend on health but in our study, people emphasised that improved health was one of the primary 'commodities' being sought out by migrants. The tensions that have been described elsewhere that arise as a result of conflicting cultures or values between locals and migrants were mentioned as a potential concern; however, as yet they have not manifested as serious problems, in part due to the fact that many of the locals who have chosen to remain share the same healthy values as the migrants and that this migration is happening by design, as part of the community's plan. However, the community may be nearing the tipping point - the increasing pressure from the cost of housing and cost of living, if it continues, could gradually lead to more tension and a shift in the demographics of the community with unknown but potentially unhealthy consequences as a result of widening wage disparities between affluent newcomers and the population of workers needed to service them.

Future research

Our research team plans to conduct similar qualitative studies in other rural communities to develop a broader understanding of the factors that influence health in different types of rural communities. We also plan to quantitatively evaluate health indicators in these communities to assess the correlation between perceived and actual health. A better understanding of the health of different types of rural communities may allow us to develop a more sophisticated model to more appropriately allocate services to communities based on need rather than size or rurality.

It is interesting to note that many of the factors that contribute to the health of individuals in a lifestyle community also appear to foster economic and environmental sustainability when compared to resource extraction communities. Examining the correlation between these factors may provide useful insights into how some attributes of communities at the more sustainable end of this spectrum can simultaneously influence health and potentially help

address and mitigate the effects of climate change by creating more resilient communities.

Limitations

This study has several limitations. It was conducted in only one community and this limits its applicability to others, even those that may appear similar. Like all qualitative research, the data are based on the subjective opinions of a purposefully selected group of participants. Their views may not be transferable to others in the town and their perceptions of the health problems may or may not be supported by objective measurements. The participants, having been selected as representatives of different demographic groups, were themselves a fairly homogenous group of almost exclusively middle-aged, middle-income Caucasians. There was little direct representation from low income or vulnerable members of the population. The two main interviewers (IH and ZR) are long-term residents of the community, known to most of the participants and this may have influenced the collection or the interpretation of the data.

Access to health services is another frequently mentioned contributor to health and although this study was focused on community-as opposed to facility-based health, the primary reference to health services suggested that it is the *absence* of many services that prevents those with health or social challenges from living here.

The late management consultant and educator, Peter Drucker, once famously said, 'Culture eats strategy for breakfast' which might be one of the limitations of trying to strategically apply the findings of this study to another community where the culture is different.

CONCLUSION

Amenity migration is likely to increase as urban housing prices increase, more urbanites recognise the many advantages of settling in smaller centres, baby boomers retire and younger people realise that, with modern telecommunication and transportation infrastructure, they no longer need to actually live in urban centres for work. There is an important opportunity for Kimberley and other rural communities to look at the health implications of this migration pattern and

consider how best to support the transition while ensuring that both locals and migrants optimise the potential health benefits of these lifestyle communities.¹²

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Healthcare utilisation among Canadian adults in rural and urban areas – The Canadian Longitudinal Study on Aging

Abstract

Objective: The objective is to determine the use of health-care services (physician visits, emergency department use and hospitalisations) in rural areas and examine differences in four geographic areas on a rural to urban spectrum.

Methods: We conducted a secondary analysis of cross-sectional data from a population-based prospective cohort study, the Canadian Longitudinal Study on Aging (CLSA). Participants included community-dwelling adults aged 45–85 years old from the tracking cohort of the CLSA ($n = 21,241$). Rurality was classified based on definitions from the CLSA sampling frame and similar to the 2006 census. Main outcome measures included self-reported family physician and specialist visits, emergency department visits and hospitalisations within the previous 12 months. Results were compared for four geographic areas on a rural-urban continuum. Univariate and bivariate analyses were performed on data from the 'tracking cohort' of the CLSA, Chi-square tests were used for categorical variables. Logistic regression models were created for the main outcome measures.

Results: Participants in rural and mixed rural and urban areas were less likely to have seen a family physician or a specialist physician compared to urban areas. Those living in rural and peri-urban areas were more likely to visit an emergency department compared to urban areas. These differences persisted after adjusting for sociodemographic and health-related variables. There were no significant rural-urban differences in hospitalisations.

Conclusion: Rural-urban differences were found in visits to family physicians, specialists and emergency departments.

Keywords: Canadian Longitudinal Study on Aging, healthcare utilisation, hospitalisation, physician visits, rural-urban disparities

Résumé

Objectif: Déterminer l'utilisation des services de santé (consultations chez un médecin, visites à l'urgence et hospitalisations) dans les régions rurales et examiner les différences dans 4 régions géographiques sur un spectre rural-urbain.

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Méthodologie : Nous avons réalisé une analyse secondaire des données transversales tirées d'une étude de cohorte prospective de population, l'étude CLSA (Canadian Longitudinal Study on Aging). La population était composée d'adultes vivant en communauté de 45 à 85 ans ayant participé à la cohorte de suivi de l'étude CLSA (N = 21 241). La ruralité était classée en fonction des définitions du cadre d'échantillonnage de l'étude CLSA et était semblable au recensement de 2006. Les principaux paramètres d'évaluation étaient les consultations rapportées par les patients chez un médecin de famille et un spécialiste, les visites à l'urgence et les hospitalisations durant les 12 mois précédents. Les résultats ont été comparés sur un continuum rural-urbain dans 4 régions géographiques. Des analyses univariées et bivariées ont été réalisées sur les données de la « cohorte de suivi » de l'étude CLSA, les tests de chi carré ont été utilisés pour les variables catégoriques. Des modèles de régression logistique ont été créés pour les principaux paramètres d'évaluation.

Résultats : Les participants des régions rurales et mixtes rurales-urbaines avaient moins tendance à avoir vu un médecin de famille ou un spécialiste comparativement aux participants des régions urbaines. Les sujets des régions rurales et périurbaines avaient plus tendance à s'être rendus à l'urgence comparativement aux sujets des régions urbaines. Ces différences ont persisté après ajustement en fonction des variables sociodémographiques et liées à la santé. On n'a observé aucune différence significative des hospitalisations entre les régions rurales et urbaines.

Conclusion : Des différences entre les régions rurales et urbaines ont été observées pour les consultations aux médecins de famille et aux spécialistes, et les visites à l'urgence.

Mots-clés : Canadian Longitudinal Study on Aging, disparités rurales-urbaines, visites chez le médecin, hospitalisations, utilisation des soins de santé

INTRODUCTION

Disparities in the health status of rural and urban Canadians have been previously noted.¹⁻⁴ While there are many determinants of health, increased attention has recently focused on the effect of rurality in determining health status and access to health services. In general, rural populations in Canada have lower socioeconomic status, lower levels of educational attainment and higher all-cause mortality rates compared to urban Canadians.¹ In addition, disparities exist between rural and urban areas in terms of access to, and utilisation of, health-care services.

Existing research on the relationship between rurality and health-care utilisation shows differences in accessing both primary care and specialist services. MacDonald and Conde noted that rural residents age 55 years and older were less likely than urban residents to have seen a family physician or specialist, even after controlling for physician density and individual health status.⁵ Allan and Cloutier-Fisher also reported fewer visits to family physicians and specialists for rural residents over age 65 years compared to their urban counterparts.⁶ Among Manitobans, southern rural and northern residents had lower ambulatory physician and specialist visit rates compared to urban residents.⁷

Other important measures of health-care utilisation and access include emergency department visits and hospitalisations. Patterns of emergency department visits may be a useful indicator of access to primary care and outpatient services. Data from the 2003 Canadian Community Health Survey (CCHS) reported that rural residents were more likely to have visited an emergency department compared to urban residents.⁸ Similarly, several studies have shown higher hospitalisation rates among rural regions compared to urban.^{5,6,9} Kazanjian *et al.* reported that hospitalisation rates increased with increasing degree of rurality.⁹

The study of health in rural areas remains difficult. Challenges exist in comparing rural-urban health as rural areas are heterogeneous in terms of health status and the factors affecting access to health services.^{2,4} Studies vary in how they define 'rural' and 'urban' which can make comparisons difficult. In addition, many studies have focused their analyses on provincial level data and relatively small geographical regions.^{6,7,10} To date, there are relatively few representative epidemiological studies that include both large urban and rural populations.¹ It follows that we do not currently have a complete description of the utilisation patterns of health-care service use among

rural areas. Subsequently, there are few recent rural-urban comparisons of service use.

To address some of these concerns, we analysed data from a nationally representative, population-based, prospective cohort study. The objectives were to describe the health-care service use in rural areas of Canada and examine rural/urban differences in service use.

The specific objectives are as follows:

1. To determine the use of health-care services, including (a) primary care visits; (b) specialist visits; (c) emergency visits; and (d) hospitalisations during the previous year in rural and urban areas
2. To determine if there are differences in four geographic areas across a rural-urban spectrum in the use of these services after adjusting for potentially confounding factors; and
3. To investigate factors which predict the use of these services, and if there are differences in these factors for these geographic areas.

METHODS

Sample

The data are from the Canadian Longitudinal Study on Aging (CLSA), a population-based, 20-year prospective cohort study.¹¹⁻¹³ Our analyses considered data from the CLSA Tracking cohort ($n = 21,241$) which was established to be as representative of the Canadian population as possible.¹⁴ Specifically, it included a large

rural population ($n = 4707$). Participants were recruited from Statistics Canada's CCHS 4.2 on Healthy Aging¹⁵ and then supplemented by recruitment using Provincial Healthcare Registration Databases and random digit dialing to achieve a target of approximately 20,000 study participants.¹⁴ Baseline inclusion criteria included community-dwelling¹³ adults aged 45–85 years and ability to understand English or French. Those with cognitive impairment at baseline were excluded. Additional exclusion criteria included being a resident of a First Nations reserve, full time members of the Canadian Armed Forces, and not being a permanent resident or Canadian citizen. Individuals living in institutions were excluded. Informed consent was obtained from all participants. Ethics approval for these analyses was granted by the University of Manitoba Bannatyne Campus Research Ethics Board, and the study adhered to the Declaration of Helsinki.

Measurements

Outcome variables

The use of health-care services including self-reported family physician visits, specialist visits, hospitalisations and emergency room visits were obtained from computer-assisted telephone interviews.¹⁶ Participants were asked 'During the past 12 months, have you had contact with any of the following about your physical or mental health?—General practitioner, family physician',

Table 1: Definitions of rurality

| Definition for analyses | Definition in CLSA | Sample size | Definition |
|-------------------------|--|-------------|---|
| Rural | Rural | 4707 | The area that remains after the delineation of urban areas which have been delineated using current census population data |
| Mixed | Postal code link to dissemination area | 2125 | This is assigned if a postal code covers a large area and it is a mixture of urban and rural area |
| Peri-urban | Urban fringe | 445 | All small urban areas within a CMA or CA that are not contiguous with the urban core of the CMA or CA |
| Peri-urban | Urban population centre outside CMA and CA | 1888 | Built up areas that are not contiguous within or contiguous with the urban core of the CMA or CA |
| Peri-urban | Secondary core | 304 | A population centre within a CMA that has at least 10, 000 persons and was the core of a CA that has been merged with an adjacent CMA |
| Urban | Urban core | 11,772 | A large urban area around which a CMA or a CA is delineated The urban core must have a population (based on the previous census) of at least 50, 000 persons in the case of a CMA, or at least 10, 000 persons in the case of a CA |

Peri-urban: Includes Urban fringe, Urban population centre outside CMA and CA, and secondary core. CLSA: Canadian Longitudinal Study on Aging, CMA: Census metropolitan area, CA: Census agglomeration

'During the past 12 months, have you had contact with any of the following about your physical or mental health?—Medical specialist (such as a cardiologist, gynaecologist, psychiatrist)', 'Were you a patient in a hospital overnight during the past 12 months?' and 'Have you been seen in an Emergency Department during the past 12 months?'¹⁴

Independent variables

We classified rurality based on the definitions in the CLSA sampling frame and similar to the 2006 census.¹⁷ The definition of rurality and the sample size within each category are shown in Table 1. For the purpose of analyses, we collapsed these into four categories: 'Rural' (Rural), 'Mixed' (Postal code link to a large dissemination area, indicating some rural, but could include some peri-urban), 'Peri-urban' (Urban fringe, Urban population centre outside a census metropolitan area or census agglomeration, and secondary core) and 'Urban' (Urban core). Thus, we have a gradient in geography of residence ranging from fully rural to fully urban.

Socio-demographic variables included age, sex, education, marital status, number of individuals in the household, household income and self-reported income adequacy.¹⁸ Self-reported income adequacy was assessed on a 5-point scale by asking participants 'How well do you think that your income currently satisfies your basic needs?'¹⁴ Functional status was measured using the Older Americans' Resources and Services Multidimensional Assessment Questionnaire.^{14,19–21} For our analyses, functional status was dichotomised to 'no impairment' versus 'any functional impairment'. Self-reported chronic conditions were also considered including chronic obstructive pulmonary disease (COPD), cancer (any site), stroke or cerebrovascular accident, heart disease (including congestive heart failure, angina and ischaemic heart disease), osteoarthritis and cataracts.²²

Analyses

To create prevalence estimates that represent the Canadian population and to better estimate associations, the CLSA has calculated inflation weights and analytic weights. These weights were

provided in the CLSA data set. We used inflation weights for descriptive statistics, while we used the analytic weights for the analyses.

We performed bivariate and multivariate analyses, using Chi-square tests for categorical variables. Multivariate logistic regression models were created for the outcomes of family physician visits, specialist visits, emergency department visits and hospitalisations. Missing data were not included in the regression models or statistical models. Following CLSA protocol, analytic weights and province of residence were included in each model. Analyses for interactions between variables of interest and rural residence were assessed by including interaction terms in logistic regression models for each independent variable. All analyses were conducted with SAS version 9.4 (SASTM, SAS Institute Inc., Cary, NC, USA).

RESULTS

Baseline characteristics of the sample are shown in Table 2. Of the sample participants, 11,772 (55.4%) lived in urban areas, 2637 (12.4%) in peri-urban areas, 2125 (10%) in mixed areas and 4707 (22.2%) in rural areas. Those living in rural areas were more likely to have a lower income and lower level of education. Numbers and percentages may not add up due to missing variables and the use of weights, as described earlier.

Overall, 17,174 (88.7%) participants saw a family physician in the preceding 12 months. The use of this service varied from 3732 (86.6%) participants in rural areas, to 1708 (88.9%) in mixed, to 2130 (88.4%) in peri-urban, and 9604 (89.4%) in urban areas ($P = 0.002$). Table 3 illustrates results from logistic regression models. Individuals living in rural and mixed areas were less likely to have seen a family physician. Those with lower education and household income were also less likely to have seen a family physician. Factors associated with visiting a family physician included female sex, living alone and functional impairment. The presence of chronic disease including COPD, cancer, heart disease and osteoarthritis were also associated with having seen a family physician.

Of all participants, 8794 (46.4%) saw a specialist in the previous 12 months with 1855 (43.4%) participants in rural areas, 742 (39.5%) in mixed,

Table 2: Baseline characteristics of the 21,241 sample participants by rurality

| Characteristic | Number of participants, <i>n</i> (%) | | | | |
|---|--------------------------------------|----------------------------|----------------------------|---------------------------------|------------------------------|
| | Total sample (<i>n</i> =21,241) | Rural (<i>n</i> =4707) | Mixed (<i>n</i> =2125) | Peri-urban (<i>n</i> =2637) | Urban (<i>n</i> =11,772) |
| Male sex* | 10406 (48.5) | 2360 (47.2) | 1020 (45.0) | 1277 (47.8) | 5749 (49.2) |
| Age* (years) | | | | | |
| 44-54 | 5832 (36.7) | 1333 (36.5) | 615 (33.8) | 719 (34.8) | 3165 (37.3) |
| 55-64 | 6564 (30.9) | 1485 (31.4) | 659 (33.2) | 870 (34.3) | 3550 (30.0) |
| 65-74 | 4634 (19.6) | 1095 (21.5) | 465 (21.1) | 517 (18.0) | 2557 (19.2) |
| 75-89 | 4211 (12.8) | 794 (10.6) | 386 (12.0) | 531 (12.9) | 2500 (13.5) |
| Marital status | | | | | |
| Married/common-law | 14601 (73.2) | 3496 (80.1) | 1588 (78.7) | 1878 (76.2) | 7639 (70.2) |
| Never married | 1698 (8.2) | 344 (6.5) | 121 (5.1) | 170 (5.7) | 1063 (9.4) |
| Widowed | 2361 (7.5) | 446 (6.4) | 218 (7.6) | 298 (7.9) | 1399 (7.8) |
| Divorced/separated | 2575 (11.0) | 420 (7.0) | 198 (8.6) | 289 (10.1) | 1668 (12.6) |
| Refused to answer | 6 (0.0) | 1 (0.0) | 0 (0.0) | 2 (0.1) | 3 (0.0) |
| Education* | | | | | |
| Less than secondary school graduation | 1986 (7.1) | 571 (10.2) | 262 (10.3) | 292 (9.0) | 860 (5.6) |
| Secondary school graduation | 2822 (12.7) | 729 (15.7) | 316 (14.7) | 384 (14.3) | 1453 (11.4) |
| Some post-secondary education | 1623 (7.5) | 361 (7.6) | 178 (9.4) | 237 (9.4) | 847 (7.0) |
| Post-secondary degree/diploma | 14667 (72.2) | 3029 (66.1) | 1365 (65.5) | 1714 (66.8) | 8559 (75.6) |
| ≥1 required question not answered | 83 (0.4) | 16 (0.3) | 4 (0.1) | 10 (0.5) | 53 (0.5) |
| Functional impairment* | | | | | |
| No ADL problems | 18705 (89.9) | 4221 (91.0) | 1859 (88.1) | 2313 (88.6) | 10312 (89.9) |
| Mild/moderate/severe/total impairment | 2408 (9.5) | 471 (8.7) | 260 (11.7) | 304 (10.8) | 1373 (9.4) |
| Inconclusive classification | 128 (0.6) | 15 (0.3) | 6 (0.2) | 20 (0.6) | 87 (0.7) |
| Living alone* | 4925 (18.1) | 874 (13.0) | 432 (16.1) | 594 (16.9) | 3025 (20.0) |
| Number of companions in household* | | | | | |
| 1 | 11094 (50.5) | 2724 (58.2) | 1225 (59.0) | 1436 (53.4) | 5709 (46.9) |
| 2 | 2713 (15.3) | 592 (14.0) | 256 (12.8) | 335 (15.7) | 1530 (15.9) |
| 3 | 1693 (11.0) | 346 (10.0) | 131 (8.1) | 177 (9.5) | 1039 (11.8) |
| 4 | 575 (3.6) | 111 (3.1) | 54 (2.9) | 69 (3.0) | 341 (4.0) |
| 5+ | 241 (1.6) | 60 (1.7) | 27 (1.1) | 26 (1.5) | 128 (1.6) |
| Self-reported income adequacy* | | | | | |
| Very well | 9593 (47.9) | 1992 (45.8) | 895 (44.0) | 1123 (44.4) | 5583 (49.5) |
| Adequately | 7337 (33.4) | 1751 (36.3) | 766 (34.6) | 954 (35.5) | 3866 (32.1) |
| With some difficulty | 1450 (6.3) | 347 (6.7) | 158 (8.2) | 197 (6.8) | 748 (6.0) |
| Not very well | 324 (1.5) | 62 (1.2) | 39 (1.9) | 46 (1.6) | 177 (1.5) |
| Totally inadequately | 167 (0.7) | 28 (0.5) | 19 (0.8) | 19 (0.7) | 101 (0.8) |
| Don't know/no answer | 180 (0.8) | 40 (0.6) | 18 (0.8) | 22 (0.8) | 100 (0.8) |
| Household income* (\$) | | | | | |
| <20,000 | 1347 (5.1) | 320 (5.0) | 139 (5.1) | 179 (5.3) | 709 (5.0) |
| 20,000-49,999 | 5849 (22.6) | 1468 (27.0) | 666 (27.2) | 793 (24.9) | 2922 (20.5) |
| 50,000-99,999 | 7220 (33.9) | 662 (36.4) | 728 (35.1) | 880 (34.1) | 3950 (32.9) |
| 100,000-149,999 | 3215 (18.0) | 638 (17.0) | 282 (15.5) | 396 (18.2) | 1899 (18.4) |
| ≥150,000 | 240 (14.6) | 346 (9.7) | 190 (11.4) | 232 (11.9) | 1472 (16.9) |
| Don't know/no answer | 1370 (5.8) | 273 (4.8) | 120 (5.7) | 157 (5.5) | 820 (6.2) |
| Chronic conditions | | | | | |
| COPD | 1436 (5.7) | 319 (5.6) | 156 (6.8) | 182 (5.6) | 779 (5.7) |
| Cancer | 3265 (13.5) | 694 (12.5) | 291 (12.4) | 411 (14.2) | 1869 (13.8) |
| Stroke or CVA | 390 (1.6) | 85 (1.6) | 37 (1.3) | 60 (2.1) | 208 (1.5) |
| Heart disease (including CHF, angina or IHD)* | 2191 (9.2) | 455 (8.5) | 189 (8.0) | 288 (9.5) | 1259 (9.5) |

Contd...

Table 2: Contd...

| Characteristic | Number of participants, n (%) | | | | |
|-----------------|-------------------------------|-------------------|-------------------|------------------------|---------------------|
| | Total sample (n=21,241) | Rural (n=4707) | Mixed (n=2125) | Peri-urban (n=2637) | Urban (n=11,772) |
| Osteoarthritis* | 5657 (24.3) | 1276 (26.0) | 570 (25.9) | 701 (24.6) | 3110 (23.7) |
| Cataracts | 5280 (20.0) | 1043 (18.6) | 518 (21.6) | 630 (19.8) | 3089 (20.3) |

* $P < 0.05$. COPD: Chronic obstructive pulmonary disease, CVA: Cerebrovascular accident, CHF: Congestive heart failure, IHD: Ischaemic heart disease, ADL: Activities of daily living

Table 3: Logistic regression models showing the odds ratio and 95% confidence interval of visiting a family physician in the last 12 months, adjusted for potential confounding variables

| Variable | OR (95% CI) | | | |
|--|------------------|------------------|------------------|------------------|
| | Model 1 | Model 2* | Model 3* | Model 4* |
| Rurality (ref: Urban) | | | | |
| Rural | 0.81 (0.71-0.92) | 0.76 (0.66-0.86) | 0.74 (0.64-0.85) | 0.74 (0.64-0.85) |
| Mixed | 0.93 (0.77-1.11) | 0.76 (0.63-0.93) | 0.78 (0.63-0.95) | 0.78 (0.63-0.96) |
| Peri-urban | 1.00 (0.85-1.18) | 0.91 (0.77-1.08) | 0.88 (0.74-1.05) | 0.89 (0.74-1.06) |
| Age (years) | | 1.04 (1.04-1.05) | 1.04 (1.03-1.05) | 1.03 (1.02-1.04) |
| Sex (ref: Male) | | 1.29 (1.16-1.44) | 1.28 (1.13-1.44) | 1.22 (1.08-1.37) |
| Education (ref: Post-secondary degree/ diploma) | | | | |
| Less than secondary school graduation | | | 0.82 (0.66-1.02) | 0.77 (0.62-0.97) |
| Secondary school graduation | | | 0.93 (0.79-1.10) | 0.93 (0.78-1.10) |
| Some post-secondary education | | | 0.99 (0.76-1.27) | 0.95 (0.73-1.23) |
| Marital status (ref: separated) | | | | |
| Single/never married | | | 0.68 (0.46-1.01) | 0.70 (0.47-1.05) |
| Married/common-law | | | 0.96 (0.67-1.38) | 0.98 (0.68-1.42) |
| Widowed | | | 0.81 (0.53-1.24) | 0.81 (0.53-1.25) |
| Divorced | | | 0.72 (0.49-1.07) | 0.76 (0.51-1.14) |
| Number of companions in household (ref: 5+people in household, excluding participant) | | | | |
| 0 | | | 1.67 (1.02-2.72) | 1.65 (1.01-2.72) |
| 1 | | | 1.47 (0.95-2.28) | 1.47 (0.94-2.30) |
| 2 | | | 1.41 (0.90-2.21) | 1.39 (0.88-2.19) |
| 3 | | | 1.13 (0.72-1.78) | 1.13 (0.71-1.79) |
| 4 | | | 0.94 (0.57-1.55) | 0.95 (0.57-1.57) |
| Household income (ref: $\geq \$150,000$) (\$) | | | | |
| <20,000 | | | 0.73 (0.53-1.00) | 0.57 (0.41-0.79) |
| 20,000-49,999 | | | 0.81 (0.65-1.02) | 0.76 (0.60-0.96) |
| 50,000-99,999 | | | 0.87 (0.71-1.06) | 0.83 (0.68-1.02) |
| 100,000-149,999 | | | 0.93 (0.76-1.15) | 0.92 (0.74-1.13) |
| Functional impairment (ref: No impairment) | | | | 1.69 (1.28-2.23) |
| Chronic conditions (ref: No condition) | | | | |
| COPD | | | | 2.00 (1.44-2.78) |
| Cancer | | | | 1.42 (1.15-1.74) |
| Stroke or CVA | | | | 1.17 (0.65-2.10) |
| Heart disease (CHF, angina, or IHD) | | | | 1.43 (1.11-1.84) |
| Osteoarthritis | | | | 1.88 (1.58-2.23) |
| Cataracts | | | | 1.03 (0.86-1.23) |

*Province was included in model. All regression models are weighted by the analytical weights. OR: Odds ratio, CI: Confidence interval, COPD: Chronic obstructive pulmonary disease, CVA: Cerebrovascular accident, CHF: Congestive heart failure, IHD: Ischaemic heart disease

1059 (44.7%) in peri-urban and 5,138 (48.2%) in urban areas ($P < 0.0001$). Results from logistic

regression models are shown in Table 4. Those living in rural and mixed areas were less likely

Table 4: Logistic regression models showing the odds ratio and 95% confidence interval of visiting a specialist in the last 12 months, adjusted for potential confounding variables

| Variable | OR (95% CI) | | | |
|--|------------------|------------------|------------------|------------------|
| | Model 1 | Model 2* | Model 3* | Model 4* |
| Rurality (ref: Urban) | | | | |
| Rural | 0.84 (0.78-0.91) | 0.82 (0.76-0.89) | 0.83 (0.76-0.91) | 0.84 (0.77-0.92) |
| Mixed | 0.70 (0.63-0.78) | 0.72 (0.64-0.81) | 0.72 (0.63-0.81) | 0.72 (0.64-0.82) |
| Peri-urban | 0.89 (0.80-0.98) | 0.88 (0.80-0.97) | 0.89 (0.80-0.99) | 0.90 (0.80-1.00) |
| Age (years) | | 1.02 (1.02-1.03) | 1.02 (1.02-1.03) | 1.01 (1.00-1.01) |
| Sex (ref: Male) | | 1.02 (0.95-1.08) | 1.02 (0.95-1.09) | 0.98 (0.91-1.06) |
| Education (ref: Post-secondary degree/ diploma) | | | | |
| Less than secondary school graduation | | | 0.78 (0.69-0.89) | 0.72 (0.63-0.82) |
| Secondary school graduation | | | 0.87 (0.79-0.97) | 0.87 (0.78-0.97) |
| Some post-secondary education | | | 1.03 (0.91-1.18) | 1.01 (0.88-1.15) |
| Marital status (ref: Separated) | | | | |
| Single/never married | | | 1.07 (0.83-1.38) | 1.12 (0.86-1.45) |
| Married/common-law | | | 1.07 (0.85-1.36) | 1.13 (0.89-1.45) |
| Widowed | | | 0.90 (0.70-1.16) | 0.91 (0.70-1.19) |
| Divorced | | | 1.10 (0.86-1.40) | 1.19 (0.91-1.54) |
| Number of companions in household (ref: 5+people in household, excluding participant) | | | | |
| 0 | | | 1.00 (0.71-1.42) | 0.99 (0.70-1.40) |
| 1 | | | 0.97 (0.70-1.34) | 0.96 (0.69-1.33) |
| 2 | | | 0.94 (0.67-1.30) | 0.93 (0.66-1.29) |
| 3 | | | 0.88 (0.63-1.24) | 0.86 (0.61-1.20) |
| 4 | | | 0.71 (0.48-1.03) | 0.69 (0.47-1.01) |
| Household income (ref: ≥\$150,000) (\$) | | | | |
| <20,000 | | | 1.28 (1.05-1.55) | 1.04 (0.85-1.27) |
| 20,000-49,999 | | | 1.08 (0.95-1.24) | 1.01 (0.88-1.16) |
| 50,000-99,999 | | | 1.07 (0.94-1.20) | 1.04 (0.91-1.17) |
| 100,000-149,999 | | | 1.10 (0.97-1.26) | 1.09 (0.95-1.24) |
| Functional impairment (ref: no impairment) | | | | 1.74 (1.53-1.96) |
| Chronic conditions (ref: No condition) | | | | |
| COPD | | | | 1.45 (1.25-1.68) |
| Cancer | | | | 1.99 (1.80-2.21) |
| Stroke or CVA | | | | 0.99 (0.74-1.33) |
| Heart disease (CHF, angina, or IHD) | | | | 2.28 (2.01-2.59) |
| Osteoarthritis | | | | 1.40 (1.29-1.52) |
| Cataracts | | | | 1.15 (1.04-1.26) |

*Province was included in model. All regression models are weighted by the analytical weights. OR: Odds ratio, CI: Confidence interval, COPD: Chronic obstructive pulmonary disease, CVA: Cerebrovascular accident, CHF: Congestive heart failure, IHD: Ischaemic heart disease

than their urban counterparts to have seen a specialist. Those with lower educational attainment were also less likely to have seen a specialist. Functional impairment, COPD, cancer, heart disease, osteoarthritis and cataracts were associated with higher access to specialists. There were no differences in specialist use by age, sex, marital status, number of household companions or income.

We noted that 4349 (21.5%) individuals had visited an emergency department in the previous 12 months. According to geography, 1019 (23.7%)

rural, 420 (22.1%) mixed, 628 (25.9%) peri-urban and 2282 (20%) urban participants visited an emergency department ($P < 0.0001$). Results from logistic regression models are shown in Table 5. Those living in a rural or peri-urban area were more likely to visit an emergency department for care. Other characteristics associated with the use of emergency departments included functional impairment, and the presence of chronic disease including COPD, cancer, stroke, heart disease, osteoarthritis and cataracts. Those with lower

Table 5: Logistic regression models showing the odds ratio and 95% confidence interval of visiting an emergency department in the last 12 months, adjusted for potential confounding variables

| Variable | OR (95% CI) | | | |
|---|------------------|------------------|------------------|------------------|
| | Model 1 | Model 2* | Model 3* | Model 4* |
| Rurality (ref: Urban) | | | | |
| Rural | 1.21 (1.10-1.33) | 1.14 (1.03-1.25) | 1.10 (1.00-1.22) | 1.12 (1.01-1.25) |
| Mixed | 1.06 (0.93-1.21) | 1.06 (0.92-1.22) | 1.00 (0.87-1.16) | 1.01 (0.87-1.17) |
| Peri-urban | 1.39 (1.24-1.56) | 1.35 (1.20-1.51) | 1.30 (1.16-1.47) | 1.32 (1.16-1.49) |
| Age (years) | | 1.02 (1.01-1.02) | 1.01 (1.00-1.01) | 1.00 (0.99-1.00) |
| Sex (ref: male) | | 1.03 (0.95-1.11) | 0.95 (0.87-1.03) | 0.92 (0.85-1.01) |
| Education (ref: Post-secondary degree/diploma) | | | | |
| Less than secondary school graduation | | | 1.07 (0.93-1.24) | 1.02 (0.88-1.18) |
| Secondary school graduation | | | 0.99 (0.88-1.12) | 1.00 (0.88-1.13) |
| Some post-secondary education | | | 1.15 (0.99-1.34) | 1.12 (0.95-1.30) |
| Marital status (ref: Separated) | | | | |
| Single/never married | | | 0.78 (0.59-1.04) | 0.77 (0.57-1.03) |
| Married/common-law | | | 0.73 (0.56-0.95) | 0.74 (0.56-0.97) |
| Widowed | | | 0.86 (0.65-1.14) | 0.84 (0.63-1.13) |
| Divorced | | | 0.74 (0.56-0.98) | 0.76 (0.57-1.02) |
| Number of companions in household (ref: 5+people in household, excluding participant) | | | | |
| 0 | | | 1.02 (0.68-1.53) | 1.00 (0.66-1.51) |
| 1 | | | 1.02 (0.70-1.50) | 1.01 (0.69-1.49) |
| 2 | | | 1.13 (0.76-1.67) | 1.11 (0.75-1.65) |
| 3 | | | 1.01 (0.67-1.51) | 0.99 (0.66-1.49) |
| 4 | | | 0.95 (0.61-1.49) | 0.94 (0.60-1.47) |
| Household income (ref: ≥\$150,000) (\$) | | | | |
| <20,000 | | | 2.01 (1.61-2.51) | 1.63 (1.30-2.04) |
| 20,000-49,999 | | | 1.54 (1.31-1.82) | 1.41 (1.19-1.67) |
| 50,000-99,999 | | | 1.26 (1.08-1.47) | 1.21 (1.04-1.42) |
| 100,000-149,999 | | | 1.13 (0.96-1.34) | 1.12 (0.94-1.32) |
| Functional impairment (ref: No impairment) | | | | 1.49 (1.31-1.69) |
| Chronic conditions (ref: No condition) | | | | |
| COPD | | | | 1.66 (1.42-1.93) |
| Cancer | | | | 1.21 (1.08-1.36) |
| Stroke or CVA | | | | 1.38 (1.04-1.84) |
| Heart disease (CHF, angina, or IHD) | | | | 1.58 (1.39-1.80) |
| Osteoarthritis | | | | 1.25 (1.14-1.37) |
| Cataracts | | | | 1.21 (1.09-1.34) |

*Province was included in model. All regression models are weighted by the analytical weights. OR: Odds ratio, CI: Confidence interval, COPD: Chronic obstructive pulmonary disease, CVA: Cerebrovascular accident, CHF: Congestive heart failure, IHD: Ischaemic heart disease

income were also more likely to visit an emergency department for medical care. No differences were found in emergency department use by age, sex, education or the number of household companions.

Regarding hospitalisations, 1877 (8.8%) individuals of the total sample had been admitted to hospital within the last year. By rurality, 412 (8.7%) rural, 163 (7.8%) mixed, 256 (9.3%) peri-urban and 1046 (8.8%) urban participants were admitted to hospital ($P = 0.647$). Results of logistic regression models are shown in Table 6.

There were no significant rural-urban differences in hospitalisations. Females were less likely to have been hospitalised in the previous 12 months. Single or widowed status, functional impairment, COPD, heart disease and osteoarthritis were all associated with hospitalisation. Household income <\$20,000 and between \$20,000 and \$50,000 was also associated with hospitalisation.

Logistic regression models were used to detect interactions between rural residence and other variables of interest. Some statistically significant interactions were found but effects were small

Table 6: Logistic regression models showing the odds ratio and 95% confidence interval of hospital admission overnight in the last 12 months, adjusted for potential confounding variables

| Variable | OR (95% CI) | | | |
|---|------------------|------------------|------------------|------------------|
| | Model 1 | Model 2* | Model 3* | Model 4* |
| Rurality (ref: Urban) | | | | |
| Rural | 1.02 (0.89-1.17) | 1.04 (0.91-1.19) | 1.02 (0.88-1.18) | 1.05 (0.91-1.22) |
| Mixed | 0.89 (0.74-1.08) | 0.92 (0.75-1.12) | 0.89 (0.72-1.10) | 0.92 (0.74-1.14) |
| Peri-urban | 1.12 (0.95-1.31) | 1.12 (0.95-1.32) | 1.10 (0.93-1.31) | 1.11 (0.93-1.33) |
| Age (years) | | 1.04 (1.03-1.04) | 1.03 (1.02-1.04) | 1.02 (1.01-1.02) |
| Sex (ref: Male) | | 0.94 (0.85-1.05) | 0.84 (0.75-0.95) | 0.78 (0.69-0.89) |
| Education (ref: Post-secondary degree/diploma) | | | | |
| Less than secondary school graduation | | | 1.18 (0.97-1.45) | 1.12 (0.91-1.38) |
| Secondary school graduation | | | 1.09 (0.93-1.29) | 1.12 (0.95-1.33) |
| Some post-secondary education | | | 1.20 (0.97-1.49) | 1.12 (0.91-1.39) |
| Marital status (ref: Separated) | | | | |
| Single/never married | | | 1.50 (0.99-2.28) | 1.69 (1.08-2.65) |
| Married/common-law | | | 1.14 (0.77-1.69) | 1.27 (0.83-1.94) |
| Widowed | | | 1.45 (0.96-2.19) | 1.60 (1.03-2.50) |
| Divorced | | | 1.14 (0.75-1.73) | 1.35 (0.86-2.11) |
| Number of companions in household (ref: 5+people in household, excluding participant) | | | | |
| 0 | | | 0.77 (0.44-1.34) | 0.73 (0.41-1.29) |
| 1 | | | 0.80 (0.47-1.35) | 0.79 (0.46-1.34) |
| 2 | | | 0.79 (0.46-1.35) | 0.77 (0.44-1.33) |
| 3 | | | 0.61 (0.35-1.07) | 0.59 (0.33-1.05) |
| 4 | | | 0.65 (0.34-1.24) | 0.64 (0.33-1.24) |
| Household income (ref: ≥\$150,000) (\$) | | | | |
| <20,000 | | | 2.39 (1.75-3.26) | 1.78 (1.29-2.45) |
| 20,000-49,999 | | | 1.67 (1.29-2.15) | 1.43 (1.10-1.85) |
| 50,000-99,999 | | | 1.17 (0.92-1.50) | 1.08 (0.85-1.38) |
| 100,000-149,999 | | | 1.16 (0.89-1.52) | 1.12 (0.85-1.47) |
| Functional impairment (ref: No impairment) | | | | 1.96 (1.66-2.31) |
| Chronic conditions (ref: No condition) | | | | |
| COPD | | | | 1.56 (1.27-1.90) |
| Cancer | | | | 1.11 (0.95-1.29) |
| Stroke or CVA | | | | 1.37 (0.95-1.97) |
| Heart disease (CHF, angina, or IHD) | | | | 1.75 (1.48-2.06) |
| Osteoarthritis | | | | 1.49 (1.30-1.70) |
| Cataracts | | | | 1.14 (0.98-1.32) |

*Province was included in model. All regression models are weighted by the analytical weights. OR: Odds ratio, CI: Confidence interval, COPD: Chronic obstructive pulmonary disease, CVA: Cerebrovascular accident, CHF: Congestive heart failure, IHD: Ischaemic heart disease

and unlikely to alter overall findings. Data are available on request.

DISCUSSION

We conducted an analysis of a population-based epidemiological study and found that there were rural-urban differences in the use of family physicians, specialist use and emergency department use. No major rural-urban differences were found in hospitalisations. Residence in a rural or mixed area reduced the likelihood of seeing a family physician

or specialist, compared to urban residence. These results are consistent with previously reported findings within Canada.⁵⁻⁷ Lower income and lower educational attainment were associated with reduced access to family physicians. Lower educational attainment was also found to be associated with reduced access to specialist services, which is consistent with previous Canadian data.^{10,23} Interestingly, we did not find that income was associated with specialist access whereas other Canadian studies have found that low income decreased the likelihood of specialist visits.^{10,23}

Rural and peri-urban areas demonstrated a higher frequency of the emergency department visits compared to urban areas. This is consistent with patterns seen in both Canada and the United States.^{8,24,25} In rural areas, reduced access to primary care may be absorbed by emergency departments resulting in higher visit rates compared to urban areas where access to primary care may be more readily available. In the United States, the emergency department use in rural areas has been studied as an indicator of access to primary care.²⁵ In Canada, a survey from 2014 found that 47% of respondents had recently used an emergency department for a condition that could have been treated by their family physician if they were available.²⁴ Similarly, a population-based study among the general population from Ontario found that having an accessible family physician decreased the likelihood of emergency department use.²⁶ Again, these data may be useful in targeting medical care in rural areas.

No rural-urban differences were found in the number of hospitalisations and these findings persisted after adjusting for various possible confounders. This is in contrast with other Canadian studies which found that hospitalisation rates were higher in rural and northern regions, possibly related to poorer health status and distance to care.^{3,5,6} These differences may be accounted for by variations in how hospitalisation data were defined and collected. For example, our data set did not include information on whether one participant may have been hospitalised multiple times over the previous year. One potential explanation for our findings is that hospitalisation is likely dependent on the number of hospitals and hospital beds in a region, which in most of Canada is determined by provincial planning. This is less true of physician or emergency department use.

STRENGTHS AND LIMITATIONS

Our study approach included both strengths and limitations. Strengths include that the data are from a nationally representative, population-based cohort study. There was a large sample size which importantly included a large rural population. Limitations include the varying definitions of rurality that exist, which can make comparisons of the literature difficult. Only one measure of rurality was included in our

analyses, and we recognise that other measures of rurality (population density, distance to urban centre, etc.) may influence the results. In particular, there may be different results with different definitions of rurality. Remote regions may have even greater differences in access to generalists and specialists than regions closer to large urban centres. We were also unable to consider any region as an individual region, since we used data that do not identify either individuals or their community of residence. Rural areas themselves are heterogeneous in terms of multiple factors, including sociocultural effects. Given our current data, we were unable to assess sociocultural effects on health-care utilisation. Some stereotypes of stoic rural individuals avoiding seeking health care may be true, but we did not consider health beliefs in our analyses. Thus, we cannot determine if differences in health care use are due to differences in accessing care, or sociocultural differences in health beliefs. In addition, we were unable to control for local contextual variables, such as physician density (family physician or specialist) or distance travelled to access healthcare services, which may affect service use estimates. We were also limited by the sampling frame of the CLSA. We did not consider First Nations communities, which may have different health care utilisation patterns than other rural and urban communities. Finally, health-care utilisation by a rural person may not happen in a rural area, but in another geographic area instead. However, we were unable to control for this with the current data.

CONCLUSION

Overall, our findings still provide important information on health-care service use in 4 geographic areas on a rural-to-urban spectrum across Canada. Low income and low educational attainment were characteristics of individuals frequently associated with lower service use. Higher dependency on emergency departments in rural and peri-urban areas may reflect greater difficulty in accessing primary care compared to urban regions. These data may be useful for targeting social interventions among certain groups and prioritising medical care in rural areas.

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The occasional eyelid lesion

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INTRODUCTION

Physicians in the primary and urgent care settings frequently encounter patients presenting with acute inflammatory eyelid nodules and eyelid swelling. The external hordeolum, which is a painful infection involving the eyelid and referred to as a 'stye' in clinical practice, is one of the most common eye/eyelid conditions reported by the general population.¹⁻³ There are no known age, sex or demographic differences in the prevalence of external hordeola but patients with chronic conditions such as diabetes, dyslipidaemia and seborrheic dermatitis may be at an increased risk.^{4,5}

Patients with an external hordeolum present with an acute-onset red, painful and swollen abscess along the margin of the eyelid. The condition is often self-limiting, lasting 1–2 weeks and can be treated conservatively. If improperly cared for, or just bad luck, rare cases can progress to preseptal or orbital cellulitis, which may result in hospitalisation and ophthalmic and intracranial complications.^{2-4,6,7} Although external hordeola are one of the most common eye/eyelid nodules, there are numerous other eyelid nodules and conditions that should be considered on the differential diagnosis.

ANATOMY/ETIOLOGY

External hordeola originate from an acute staphylococcal infection of the sebaceous glands (Glands of Zeiss) or modified apocrine glands (Glands of Moll) found along the margin of the upper and lower eyelid.^{3,4} Together, the Glands of Zeiss and Moll produce secretions with antibacterial and immune defence properties.^{1,4,8} The Glands of Zeiss secrete into a duct at the base of the eyelash hair follicle, while the Glands of Moll secrete directly to the eyelid surface next to the base of the eyelashes and anterior to the meibomian glands.⁸ When the glands become blocked, or if stasis occurs, bacterial proliferation and infection can occur. As the infection results in a localised inflammatory response, a purulent and palpable abscess will form along the eyelid margin at the base of the eyelashes.⁴ *Staphylococcus aureus* is the most common bacterial culprit in external hordeolum formation.^{3,9}

It is important to note that an external hordeolum differs from an internal hordeolum, which maintains its name in clinical practice. Internal hordeola arise from the meibomian glands, which are modified sebaceous glands found in the tarsal plate of the eyelids; they are responsible for secreting

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an oily substance that aids in lubrication of the eyelid.^{2,3,10} With meibomian gland dysfunction, stasis and subsequent infection with *Staphylococcus aureus* can also occur. Due to the deeper positioning of the meibomian glands, internal hordeola present with painful swelling within the tarsal plate, and thus, are less defined in their appearance compared to their external counterparts, and they tend to be more painful and longer lasting.^{3,5,11} Conditions associated with internal hordeola include blepharitis, acne rosacea, trichiasis and cicatricial ectropion.¹¹⁻¹³

Chalazia are another form of nodule-forming eyelid lesion that share similarities with hordeola. These non-infectious lesions occur secondary to mechanical obstruction and meibomian gland dysfunction with subsequent stasis and blockage of sebum leading to a lipogranulomatous reaction.^{2,9} A chalazion tends to have an indolent and chronic presentation, and it manifests as a persistent, painless localized nodule within the eyelid or at the eyelid margin [Figure 1].^{2,9}

HISTORY, PHYSICAL EXAM, DIAGNOSIS AND DIFFERENTIAL

The diagnosis of external hordeolum is clinical, so a careful history and physical examination is essential. No diagnostic tests or imaging are required or useful in the diagnosis. Bacterial cultures do not aid in diagnosis, treatment or clinical improvement.²

A focused history should determine the duration of symptoms, any prior lesions and any history of foreign body, ocular trauma, decreased vision, fever or pain with ocular movements. Upon examination, the lesion is characterised by acute-onset erythema, swelling and pain near the upper or lower eyelid margin. Along with an external hordeolum, other lesions that should be considered when examining a patient with a nodule on their eyelid are: Internal hordeolum, blepharitis, chalazion, xanthelasma, molluscum contagiosum, eyelid malignancy, pre-septal and orbital cellulitis.

EXTERNAL HORDEOLUM

The primary symptom of an external hordeolum is localised pain and tenderness on one eyelid; this may be preceded by generalised edema and

erythema of the eyelid in some cases.^{2,3,9} The infection is typically localised and points to the eyelid margin as an inflammatory pustule or papule surrounded by swelling and erythema.^{2,3,9} The lesion will be tender to palpation and the intensity of pain experienced by the patient will be proportionate to the degree of eyelid swelling.³ There should not be any pain in ocular movements, and if there is pain with ocular movements, one must be suspicious of ocular cellulitis [Figure 2].

INTERNAL HORDEOLUM

An internal hordeolum typically presents with more diffuse tenderness and erythema. To differentiate an internal hordeolum from an external hordeolum, the patient's eyelid should be everted, so the conjunctival surface can be examined. This can be done by placing a cotton-tipped swab on the outside of the upper lid and gently flipping the lid over the cotton swab.^{2,9} To examine the lower eyelid conjunctival surface, gently grasp the lower eyelid and pull it downwards or ask the patient to do this for you [Figure 3].

A tender pustule or papule directly on the eyelid margin or on the conjunctival surface indicates an internal hordeolum.^{2,3,5,9} In some cases, differentiating between an external and internal hordeolum will not be possible; however, treatment for both infections is generally the same.^{2,9}

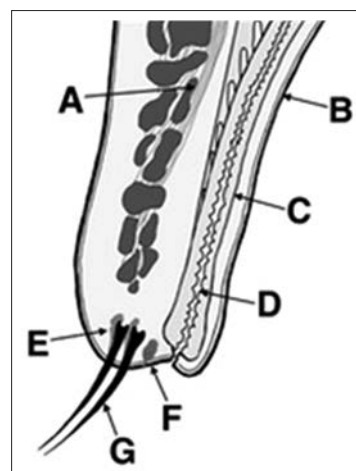


Figure 1: Eyelid gland anatomy. (a) Orbicularis oculi, (b) Tarsal conjunctiva, (c) Tarsum, (d) Meibomian gland, (e) Gland of Zeis, (f) Gland of Moll, (g) Eyelash. Adapted from McAlinden, González-Andrades, and Skiadaresi⁵.

BLEPHARITIS

Blepharitis is a related condition which also involves inflammation of the eyelid margin, so it must be considered in the differential diagnosis. Blepharitis is characterised by red and pruritic eyelids, crusting of the eyelids and matting of the eyelashes, conjunctival injection, excessive tearing, photophobia and sometimes flaking of the eyelid skin.² In contrast to an external hordeolum, internal hordeolum and a chalazion, blepharitis does not cause a discrete nodule within the eyelid; however, blepharitis can lead to the development of an internal hordeolum, so the two conditions can occur simultaneously [Figure 4].^{2,12}

CHALAZION, XANTHELASMAS AND MOLLUSCUM CONTAGIOSUM

A chalazion, as opposed to a hordeolum, has a more sub-acute presentation and manifests with a non-tender nodule with no or mild erythema. Chronic skin changes may be present around the underlying nodule.^{2,4} Figure 5 illustrates a left eyelid chalazion with mild erythema. Other non-erythematous and non-tender lesions, including xanthelasmas and molluscum contagiosum, can also present on a patient's eyelids. Xanthelasmas are soft, cholesterol filled, yellow plaques that are associated in middle-aged and older adults, and they are typically associated with hypercholesterolemia.¹⁸ Figure 6 depicts bilateral xanthelasmas. Conversely, molluscum contagiosum is a poxvirus that produces single or multiple small, flesh-coloured papules with a central umbilication; they typically occur in children.¹⁹

EYELID MALIGNANCY

Persistent or recurrent painful nodules or masses may suggest a basal cell carcinoma or rarely, an eyelid sebaceous gland carcinoma, keratoacanthoma, squamous cell carcinoma or melanoma.¹⁹ Basal cell carcinomas account for 85%–90% of all eyelid carcinomas; they are firm, slow-growing, painless and indurated lesions.^{19,21,22} On some occasions, there is associated telangiectasia and eyelash loss.^{21,22} These lesions are most frequently located on the lower eyelid margin, but they can occur elsewhere,

including the medial canthus, upper eyelid and lateral canthus.²³ They occur most commonly in fair-skinned individuals with a history of sun exposure, and research suggests they may be associated with basal cell nevus syndrome or xeroderma pigmentosum.^{21,22} Patients with a



Figure 2: An external hordeolum¹⁴.

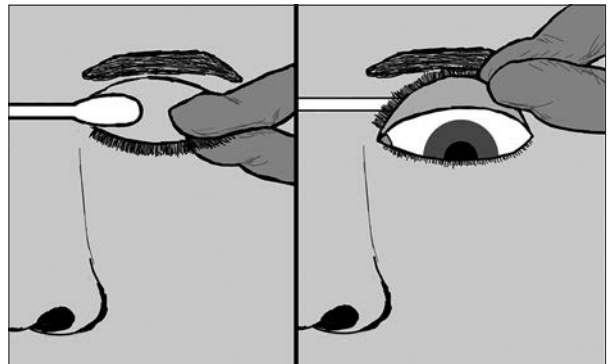


Figure 3: Upper eyelid conjunctival surface examination: grasp the patient's eyelid with a gloved hand (using your thumb and index finger), then twist the cotton tip applicator while everting the patient's eyelid. Based on University of Ottawa, Faculty of Medicine¹⁵.

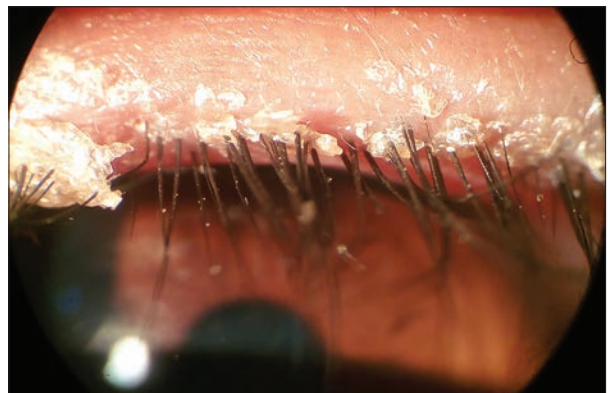


Figure 4: Blepharitis (magnified view)¹⁶.

possible eyelid malignancy should be evaluated with a computed tomography (CT) and punch biopsy, and urgently referred to ophthalmology or plastic surgery.²

PRESEPTAL OR ORBITAL CELLULITIS

Pain during ocular movements, severe periorbital swelling and erythema, or fever are all red flags for possible preseptal or orbital cellulitis.²⁴⁻²⁸ All patients with red flag symptoms need aggressive and urgent investigations and management, including empiric oral antibiotics for preseptal cellulitis, urgent CT and broad-spectrum intravenous (IV) antibiotics for orbital cellulitis²⁴⁻²⁸ Figure 7.

A summary of the above-described eyelid nodules and their respective characteristics is outlined in Table 1.

MANAGEMENT

The external hordeolum is usually a self-limiting condition as lesions often drain spontaneously within 1–2 weeks. If treatment is required, it is primarily conservative. To facilitate drainage and hasten recovery, clean warm compresses can be applied to the lesion several times a day (for 10 min at least 4 times a day), and a gentle massage with clean hands can be applied to the area.^{2,3,9,30} These methods are considered the gold standard for external hordeola management; however, there are no studies confirming their efficacy in shortening the duration of symptoms or improving outcomes.² If the clinician is unsure of whether or not the patient has an external or internal hordeolum, massaging should be used with caution, as massaging an internal hordeolum could irritate the cornea.³¹

Lid scrub with saline or baby shampoo that is tear-free and ph-balanced, may promote lesion drainage by clearing debris from clogged glands and removing bacteria by breaking down cell membranes.^{12,32,33}

Topical erythromycin ophthalmic (0.5%) ointment twice daily for 7–10 days can also be considered during treatment to prevent infection of surrounding eyelash follicles and reduce inflammation.^{2,34} This will not alter the course of the external hordeolum and there is minimal



Figure 5: A chalazion¹⁷.



Figure 6: Xanthelasma (bilaterally)²⁰.



Figure 7: Orbital cellulitis²⁹.

evidence demonstrating a benefit from the use of topical antibiotics.^{2,3} Systemic antibiotics are not indicated for external or internal hordeola.² Oral antibiotics should only be considered if there is progressively worsening or significant surrounding erythema, signs of bacteraemia, if the patient has tender preauricular lymph nodes, or if there is a concern for progression to preseptal cellulitis.^{28,35-37}

If the above-mentioned treatment options fail, minor procedural treatments are indicated. Incision and drainage may be performed in cases where the abscess is pointing (a pustule is present).^{2,9} External incisions may lead to scarring, so making an external eyelid incision is inadvisable, unless there is a visible pustule.⁹ Incision and drainage of the external hordeola can be performed in the primary care office or emergency department. If the provider is not certain whether or not the lesion is fit for incision and drainage, not confident in their ability to incise and drain the lesion, or

Table 1: Overview of the differential diagnosis for an eyelid nodule

| Condition | Characteristics |
|-----------------------|---|
| External hordeolum | Localized, erythematous and painful nodule with variable swelling Located on the eyelid margin and points to the eyelid margin as an inflammatory papule or pustule |
| Internal hordeolum | Diffuse, erythematous and tender nodule with more swelling Located within the eyelid margin and points to the conjunctival |
| Blepharitis | No discrete nodule Erythematous and pruritic eyelids with eyelid crusting, flaking skin and matting of the eyelashes Ocular features, such as conjunctival injection, photophobia and excessive tearing |
| Chalazion | Non-tender nodule with no or mild erythema and possible chronic skin changes |
| Xanthelasma | Non-tender or erythematous Soft, yellow plaques filled with cholesterol often found in middle and older-aged adults |
| Molluscum contagiosum | Nontender or erythematous Single or multiple small, fleshed-coloured papules with central umbilication |
| Malignancy | Persistent or recurrent, slow-growing, painless and indurated lesions Can be located anywhere on the eyelid and may be associated with telangiectasia and eyelash loss |
| Preseptal cellulitis | Ocular pain, tenderness, diffuse, warm, eyelid swelling and erythema with possible chemosis and fever |
| Orbital cellulitis | Ocular pain, tenderness, diffuse, warm, eyelid swelling and erythema Decreased ocular movements, pain with eye movements, fever and possible decreased visual acuity and proptosis |

if they do not have any experience incising and draining eyelid lesions, referral to an optometrist or ophthalmologist may be appropriate.

Alternatively, if the point of the external hordeolum is at the base of an eyelash forming a furuncle, removal of that one eyelash (epilation of the hair follicle) may promote drainage and healing.^{3,34} Epilation should be performed with caution and only the culprit eyelash should be removed.

Internal hordeola can be treated with the same approach as external hordeola.¹¹ They often drain spontaneously within 1 to 2 weeks, and the first-line treatment is conservative: a clean warm compress. Lid scrubs and gentle massage with clean hands can also be used with caution to avoid irritating the cornea. Akin to external hordeola management, if conservative treatment fails, incision and drainage may be performed in cases where the abscess is pointing.^{10,11}

Conservative treatment is also the mainstay of chalazion and blepharitis management. Chalazia can typically be managed by the application of clean, warm compresses several times a day, and if necessary, incision and curettage.^{2,38} Conversely, blepharitis can often be managed by good lid hygiene, which includes warm compresses, lid washing and massage and artificial tears. For patients with blepharitis who do not respond to conservative treatment, or for those with severe

symptoms, topical or oral antibiotics therapy is recommended.^{38,39}

PROCEDURE: EXTERNAL HORDEOLUM INCISION AND DRAINAGE

Equipment

- Sterile gloves and saline-soaked swabs
- 18G needle OR
- Scalpel handle and #11 blade
- Chalazion clamp (if available) or a cotton tip applicator
- Tweezers
- Gauze
- Saline-soaked gauze.

Procedure

- Have the patient lie supine and stand lateral to them on the side of the external hordeolum, so you are comfortable accessing it
- Inspect the lesion to confirm its size, location, presence of a pustule and that it is an external hordeolum and not an internal hordeolum or chalazion. Rule out the signs of cellulitis during inspection
- Cleanse the area with saline soaked swabs
- Use your non-dominant hand to expose the pustule of the external hordeolum. If the external

hordeolum is on the eyelid margin, use the chalazion clamp or a cue tip to evert the eyelid to better expose the external hordeolum. Warn the patient of possible discomfort before everting their eyelid

- Once the external hordeolum's pustule is adequately exposed, ask the patient to remain still and use the point of the needle or scalpel to make a stab incision to the point of the external hordeolum. During the incision, rest the lateral side of your hand on the patient's lateral forehead or cheek to help stabilise your movement. To avoid disrupting eyelash growth do not make an incision directly on the eyelash line
- Once an incision is made, gently massage the external hordeolum with your gloved index fingers or by using one cotton tip applicator and an index finger to express the abscess. It may be necessary to make an additional incision if no drainage occurs, especially for a larger external hordeolum
- Gently remove any drained purulent material or blood with a piece of dry gauze
- Following drainage, provide the patient with saline-soaked gauze and ask them to compress the lesion for 5–10 min.

EPILATION

Equipment

- Tweezers
- Gauze
- Saline-soaked gauze.

Procedure

- Follow steps 1–4 as described above. Ensure the pustule is at the base of an eyelash follicle
- Once the external hordeolum pustule is adequately exposed, ask the patient to remain still and use the pair of tweezers to remove the culprit eyelash. While doing so, rest the lateral side of your hand on the patient's lateral forehead or cheek to help stabilise your movement. Only remove the one eyelash
- Follow steps 5–7 as described above.

POST-PROCEDURE MANAGEMENT

Instruct the patient to continue applying a warm compress to the external hordeolum for 10 min

at least four times a day until inflammation and swelling resolves. Communicate potential complications (below) with the patient before discharge. Re-evaluate the patient again within 48–72 h to ensure that healing is taking place.²

COMPLICATIONS

Potential complications during incision and drainage include bleeding and damage to surrounding structures. The procedure should be performed with caution to avoid inadvertent contact with structures other than the external hordeolum, namely the cornea.

Although uncommon, an untreated or poorly treated external hordeolum (i.e., incomplete drainage) may progress to localised cellulitis on the eyelid or surrounding skin.^{2,4} If the infection is allowed to progress, preseptal or orbital cellulitis can ensue. Mild preseptal cellulitis, which is characterised by swelling and erythema extending beyond the external hordeolum with no signs of systemic toxicity, can usually be managed rapidly in the outpatient setting with empiric oral antibiotics and close follow-up. There is a lack of randomised trials of antibiotic regimens for preseptal cellulitis, but the following combination regimens have been suggested: Trimethoprim-sulfamethoxazole or clindamycin with amoxicillin, amoxicillin-clavulanic acid, cefpodoxime or cefdinir.⁴⁰

Preseptal cellulitis typically demonstrates a quick response with appropriate antibiotic therapy and patients should be re-evaluated in 24–48 h.³⁴ Unresponsive or worsening preseptal cellulitis and/or signs of more significant infection, including severe swelling and erythema extending beyond the external hordeolum, fever, tender preauricular lymph nodes, painful ocular movements and proptosis warrant re-evaluation.^{2,4,34} Complete blood count with differential and culture may be required, and if there are signs of orbital cellulitis, an orbital CT scan may be needed.³⁴ In these cases, hospitalisation and prompt treatment with broad-spectrum IV antibiotics are required.^{35–37} The initial antibiotic treatment includes a combination of vancomycin and ceftriaxone or cefotaxime.⁴⁰

CONCLUSION

Patients with eyelid nodules may present to the emergency department or primary care clinic.

The majority of painful nodules will be hordeola that can be managed conservatively with daily intermittent warm compress; however, lid scrubs, antibiotic ointments, incision and drainage or epilation are all options in the management repertoire. If there is any doubt of the diagnosis, the patient should be referred to an optometrist or ophthalmologist. Preseptal or orbital cellulitis should always be considered and managed accordingly during evaluation, diagnosis and treatment.

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Survival of Boerhaave syndrome against all odds at a rural Emergency Department

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INTRODUCTION

Boerhaave syndrome (BS) is rare, yet it is one of the most lethal emergencies. It is caused by a spontaneous full-thickness rupture of a previously healthy oesophagus following a sudden increase of the intra-oesophageal pressure against closed glottis.

BS was first accurately described in 1724 after a Dutch Physician, Hermann Boerhaave, performed a post-mortem autopsy on his friend's body to determine the cause of his sudden death.¹ Due to its high mortality rate, early diagnosis is crucial in determining a patient's survival. Rural and small hospital emergency departments (EDs) face a bigger challenge when diagnosing such time-sensitive emergencies due to the lack of after-hours advanced diagnostic and specialist coverage,² delayed inter-hospital transfers and response time of on-call staff. The authors present a rare case of BS survival under such extenuating circumstances in a rural ED.

CASE REPORT

In January 2011, during a snowstorm, a 36-year-old male presented at

midnight to the ED of Milton District Hospital, a small town hospital in Ontario, Canada. The hospital had no in-house specialists or after-hours advanced diagnostic imaging. The only available doctor was a single emergency physician.

The patient described a 30-min history of nausea and vomiting followed by a sudden severe epigastric pain radiating to the back associated with dyspnoea and orthopnoea. He had no past medical history and was not on any medications.

On physical examination, he looked dyspnoeic with shallow rapid breathing, diaphoretic and orthopnoeic. His vital signs showed tachycardia, tachypnoea and he was afebrile. On chest auscultation, he had decreased air entry bilaterally and normal cardiac examination. He had severe abdominal tenderness with guarding mostly over the epigastrium. Electrocardiogram showed sinus tachycardia with no ischaemic changes.

The laboratory investigations were unremarkable. The initial chest radiograph performed at 1:30 am showed an extensive pneumomediastinum and a small

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left-sided pleural effusion with atelectasis/consolidation at the base of the left lung [Figure 1]. Because the differential diagnosis of pneumomediastinum is broad and in order to reach a definitive diagnosis, we requested a computed tomography (CT) scan of the chest and abdomen. However, due to after-hours closure of the diagnostic facility, we called the on-call radiologist to approve our request. The on-call radiologist subsequently directed the on-call CT technician to drive to the hospital, and we were given a 30–45 min average wait time depending on the road conditions. Up to that time, the patient was stable; however, the intensity of the chest pain was increasing.

The CT scan of the chest [Figure 2] performed at 03:30 am revealed lower oesophageal perforation with left-sided moderate and right-sided small pleural effusion with dependent atelectasis associated with heterogeneous pulmonary density, possibly reflecting extensive pneumomediastinum extending into the lower neck. The abdominal CT scan showed no acute findings and helped to rule out intra-abdominal aetiology.

The patient received intravenous hydration, analgesia and broad-spectrum antibiotics. The respiratory technician was also called in from home due to increased work of breathing and declining oxygen saturation of the patient.

After reaching the definitive diagnosis, the regional thoracic surgeon on call was consulted at a tertiary care centre, Toronto General Hospital, who recommended bilateral chest tube insertions prior to transfer. The local general surgeon was called in to assist with the chest tube insertion.

However, while inserting the first chest tube on the left side, the patient deteriorated into respiratory failure requiring emergency endotracheal intubation and mechanical ventilation. While securing the airway and initiating mechanical ventilation, the on-call general surgeon arrived and inserted two more chest tubes, which yielded serosanguinous fluid.

The last chest radiograph [Figure 3] was done at 7:30 am before transfer to tertiary care showing near-complete opacification of the left hemithorax, endotracheal tube in place with tip 2.9 cm superior to carina and bilateral chest tubes in place.

Due to the ongoing snowstorm, our request of transfer by air ambulance was denied. The patient was stabilized for transfer by land ambulance



Figure 1: Chest radiography demonstrating an extensive pneumomediastinum and a small left-sided pleural effusion with atelectasis/consolidation at the base of the left lung.

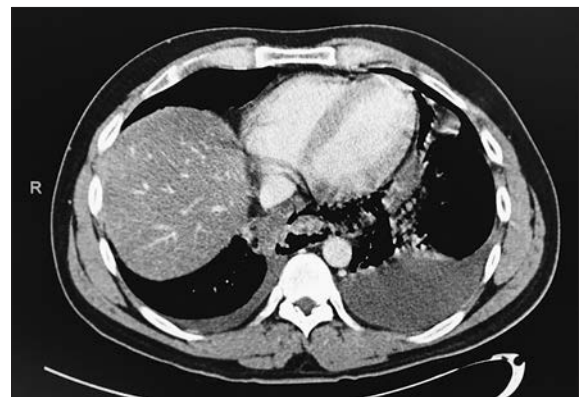


Figure 2: Chest computed tomography scan revealing a lower oesophageal perforation with left-sided moderate and right-sided small pleural effusion with dependent atelectasis associated with heterogeneous pulmonary density, possibly reflecting extensive pneumomediastinum extending into the lower neck.

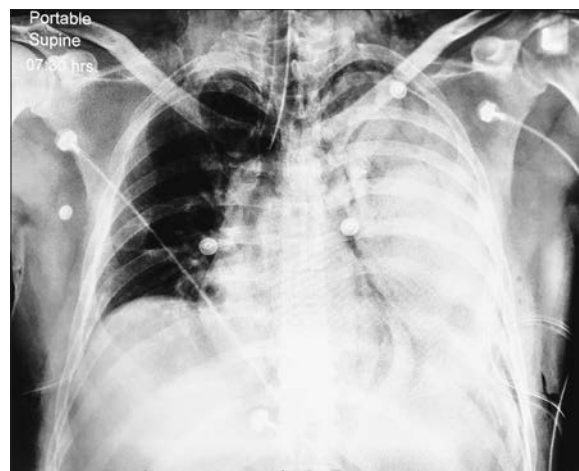


Figure 3: Chest radiography showing near-complete opacification of the left hemithorax. Endotracheal tube in place with tip 2.9 cm superior to carina. Bilateral chest tubes in place.

and departed the ED at 9:30 am. The receiving thoracic surgeon performed an open pleural lavage and oesophageal repair. We followed the patient's course of therapy and met with him 2 years later to find him in great condition.

DISCUSSION

Early diagnosis is crucial in determining the survival from BS as it carries a high mortality rate which increases sharply with delayed diagnosis and treatment. Every hour of delayed surgical treatment results in a 2% increase in mortality rate to virtually 100% if treatment is delayed by more than 48 h.³

It is crucial that BS is included in the differential diagnosis of patients presenting with chest or epigastric pain as one of the six fatal causes of chest pains that every emergency physician should think of first.⁴

Being aware that BS could deteriorate rapidly into respiratory failure and fatal shock, the rural emergency physician should make early diagnosis and early surgical intervention the most important factor in determining morbidity and mortality rate.

The classic presentation is described by Mackler's triad of vomiting, chest pain and subcutaneous emphysema; however, the triad is only present in <50% of cases.⁵ Misdiagnosing BS is common, especially in the absence of advanced imaging. The most common diagnostic errors include perforated gastric or duodenal ulcer, myocardial infarction, pneumonia, acute pancreatitis, dissecting aortic aneurysm, pneumothorax, pulmonary embolism and renal colic.⁶

CT of the chest with intravenous and oral contrast provides greater diagnostic sensitivity and specificity. A CT scan is considered the diagnostic gold standard. However, only 17% of rural hospitals in the province of Ontario have access to a CT scanner.⁷ The lack of access to local CT scanners imposes a significant burden on the physician's decision-making process in rural EDs. Research has shown that rural CT scanners change the area's quality of health care in significant ways and it helps to narrow the gap between rural and urban service levels.⁸

Therapeutic options are mostly based on open surgical repair as the most definitive

option. Recently, conservative and endoscopic treatments have been suggested in a very limited population according to the following criteria: (1) The oesophageal rupture is confined to the mediastinum; (2) The cavity is well drained into the oesophagus; and (3) the patient has minimal symptoms and no evidence of clinical sepsis.⁹

CONCLUSION

This unique case represents survival against all odds by presenting with a severe case of BS to a rural ED with no in-house advanced diagnostic or surgical services, after midnight and during a Canadian winter. The patient of this reported case also suffered a rare, rapid deterioration into acute respiratory distress syndrome requiring emergency endotracheal intubation and bilateral chest tube insertions before out-of-hospital transfer to a tertiary care centre. Boerhaave's syndrome still represents a diagnostic and therapeutic challenge, especially for rural EDs. Timely diagnosis is the important prognostic determinant.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest: There are no conflicts of interest.

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