Canadian Journal of Rural Medicine
CJRM CMR
Journal canadien de la médicine rurale

Original Article
Article original

Characterizing high-frequency emergency department users in a rural northwestern Ontario hospital: a 5-year analysis of volume, frequency and acuity of visits

Cai-lei Matsumoto, MSc
Sioux Lookout First Nations Health Authority, Sioux Lookout, Ont.

Terry O'Driscoll, MD, CCFP, FCFP
Sharen Madden, MD, MSc, CCFP, FCFP
Northern Ontario School of Medicine, Sioux Lookout, Ont.

Britanny Blakeloch, RN
Sioux Lookout Meno Ya Win Health Centre, Sioux Lookout Ont.

Len Kelly, MD, MSc, CCFP, FCFP, FRRM
Anishinaabe Bimaadiziwin Research Program, Sioux Lookout, Ont.

Correspondence to:
Len Kelly,
lkelly@mcmaster.ca

This article has been peer reviewed.

Introduction: High-frequency emergency department users contribute substantially to urban emergency department workloads. The scope of this issue in rural emergency care provision is largely unknown.

Methods: We retrospectively analyzed emergency department visits at the Sioux Lookout Meno Ya Win Health Centre and associated primary care data from 2010 to 2014 for high-frequency (≥ 6 annual visits) and non–high-frequency(< 6 annual visits) emergency department users.

Results: High-frequency use of the emergency department was stable over the study period. High-frequency users constituted 7.2% of the emergency department patient population and accounted for 31.3% of the emergency department workload and 24.3% of hospital admissions. High-frequency users had similar clinical presentations as non–high-frequency users but required fewer admissions per emergency department visit (5.3% vs. 7.6%, $p < 0.001$). High-frequency users had more low-acuity presentations and concurrently accessed primary care services twice as often as non–high-frequency users. Females outnumbered males across all age categories in both user groups.

Conclusion: High-frequency emergency department use is an important issue for rural hospitals. High use of this rural emergency department was not associated with limited use of primary care services. Aside from accepting that "they will always be with us," more research, particularly qualitative, is needed to understand why some patients frequently visit a rural emergency department.

Introduction : Les grands utilisateurs des services d'urgence contribuent substantiellement au fardeau de ces unités en milieu urbain. On connaît mal l'ampleur de cet enjeu lorsqu'il est question des services d'urgence en milieu rural.

Méthodes : Nous avons analysé rétrospectivement les consultations aux services d'urgence du Centre de santé Meno Ya Win de Sioux Lookout et les données associées concernant les soins primaires de 2010 à 2014 chez les grands utilisateurs (≥ 6 consultations/année) et les autres utilisateurs (< 6 consultations/année) des services d'urgence.

Résultats : Chez les grands utilisateurs, le recours aux services d'urgence est demeuré stable pendant la période de l'étude. Ils ont représenté 7,2 % de l'achalandage de ces services, 31,3 % du fardeau de travail et 24,3 % des hospitalisations. Les grands utilisateurs présentaient des tableaux cliniques similaires à ceux des autres utilisateurs, mais ont nécessité moins d'hospitalisations par consultation (5,3 % c. 7,6 %, $p < 0,001$). Les grands utilisateurs présentaient plus de tableaux peu aigus et accédaient concomitamment aux services de soins primaires 2 fois plus souvent que les autres utilisateurs. Les femmes étaient plus nombreuses que les hommes, toutes catégories d'âge confondues, chez les 2 types d'utilisateurs.

© 2018 Society of Rural Physicians of Canada

Conclusion : Les grands utilisateurs des services d'urgence constituent un enjeu de taille pour les hôpitaux ruraux. La grande utilisation de ces services d'urgence n'a pas été associée à une utilisation limitée des services de soins primaires. À part se résigner au fait que « les grands utilisateurs feront toujours partie du tableau », il faut approfondir la recherche, qualitative principalement, pour comprendre pourquoi certains patients consultent souvent les services d'urgence de l'hôpital rural.

INTRODUCTION

Rural emergency departments provide a critical link for community health. In 2016 in Ontario, there were 44 emergency department visits per 100 population.[1] A recent study in northwestern Ontario showed an annual emergency department visit rate of 62 per 100 population.[2]

The nature of a rural emergency department is characteristically different from an urban emergency department. In small community hospitals, patients are often seen in the emergency department by their primary care physician and may even be asked to return to the emergency department for follow-up, the only option for after-hours care. This likely contributes to the increased emergency department use in rural areas.[3–5] Providing coverage in rural hospitals poses an onerous workload for rural physicians. Emergency department shifts are generally covered by the same practitioners who manage daytime family practices and provide local obstetrical care.

In both urban and rural hospitals, high-frequency emergency department users make a substantial contribution to the emergency department workload. This subset of patients generally constitutes 4%–8% of emergency department visitors and accounts for 20%–30% of the number of emergency department visits.[6] In general, the literature describes this issue in large urban hospitals, with limited information on rural emergency services. Although no standard definition of high-frequency emergency department use exists, 4 or more annual visits is often used in urban studies.[7] We recently proposed a definition of high-frequency emergency department use for rural settings of 6 or more emergency department visits per year, which identifies about 8% of emergency department patients.[3]

Understanding these high-frequency users may allow for targeted programming or interventions, or may simply better inform us about this high-needs patient group. The purpose of this study was to document the extent of high-frequency emergency department use in a rural hospital in northwestern Ontario.

METHODS

The setting for the study was the Sioux Lookout Meno Ya Win Health Centre (SLMHC), a 65-bed hospital in northwestern Ontario. Its emergency department serves a vast geographic area (385 000 km^2) and a primarily First Nations population of 29 000 living both locally and in 31 remote First Nations communities (most without road access). When a physician is not "in-community," residents initially access urgent and emergency care at the local nursing station supported by nurse/physician telephone triaging. Patients with high-acuity conditions from northern communities are transported by airplane (medivac) by the provincial medical transportation service, Ornge. Patients with less acute conditions referred from nursing stations are transferred via scheduled air flights ("schedivac"). Several nearby First Nations communities access hospital services by road. Triage scoring followed the Canadian Triage and Acuity Scale (CTAS). Classification of diagnoses was established by the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10).

We retrospectively analyzed anonymized hospital and primary care information from 2010 to 2014, obtained from the National Ambulatory Care Reporting System and the IntelliHEALTH database of the Ontario Ministry of Health and Long-Term Care. We defined high-frequency users as those with 6 or more emergency department visits annually.

Statistical analysis

We performed statistical analysis using SPSS version 21 (IBM Corp.), employing the χ^2 test for independence. Patient hospital data included sex, age, diagnosis (ICD-10 codes) and disposition. Primary care data included all office visits to an Ontario physician.

Ethics approval

The Sioux Lookout Research Review and Ethics Committee approved the study.

RESULTS

In the 5-year study period, 33 435 patients made 80 212 emergency department visits (annual visit rate 55.3 per 100 population). High-frequency users constituted 7.2% (2398) of the total emergency department patient population.

The proportion of high-frequency users remained stable throughout the study period (Fig. 1). High-frequency patients accounted for 31.3% (25 118) of emergency department visits and 24.3% (1341) of hospital admissions (Fig. 2). Despite visiting repeatedly with benign presentations, they frequently required admission (Fig. 2, Table 1). High-frequency patients had an admission rate per visit of 5.3%, compared to 7.6% for non–high-frequency emergency department users ($p < 0.001$).

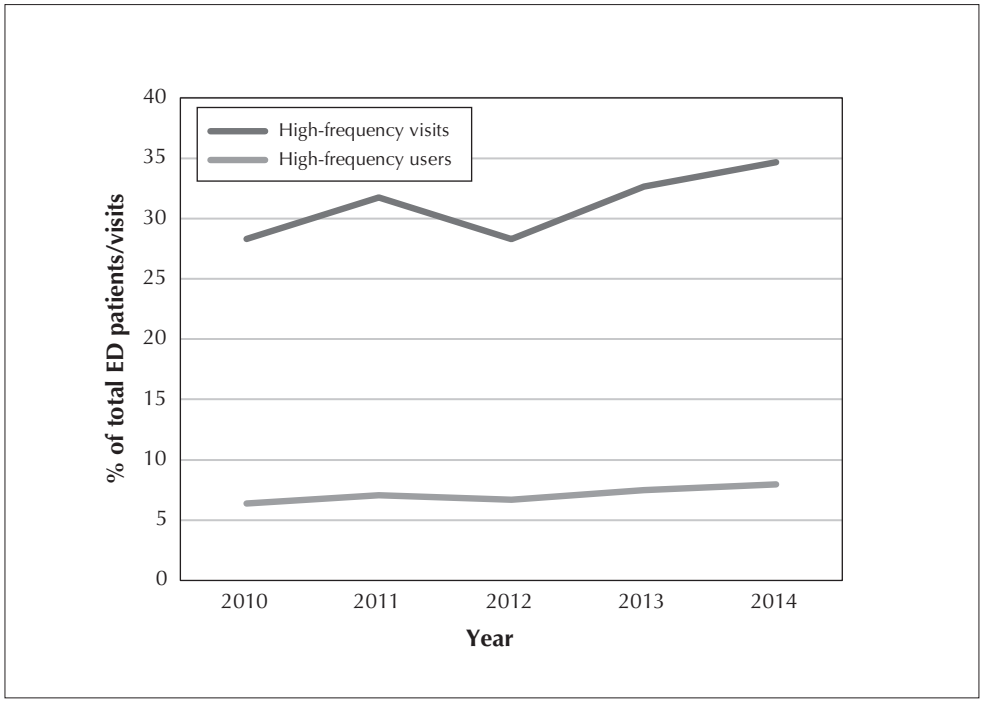


Fig. 1: Proportion of high-frequency users and visits to the Sioux Lookout Meno Ya Win Health Centre emergency department (ED), 2010–2014.

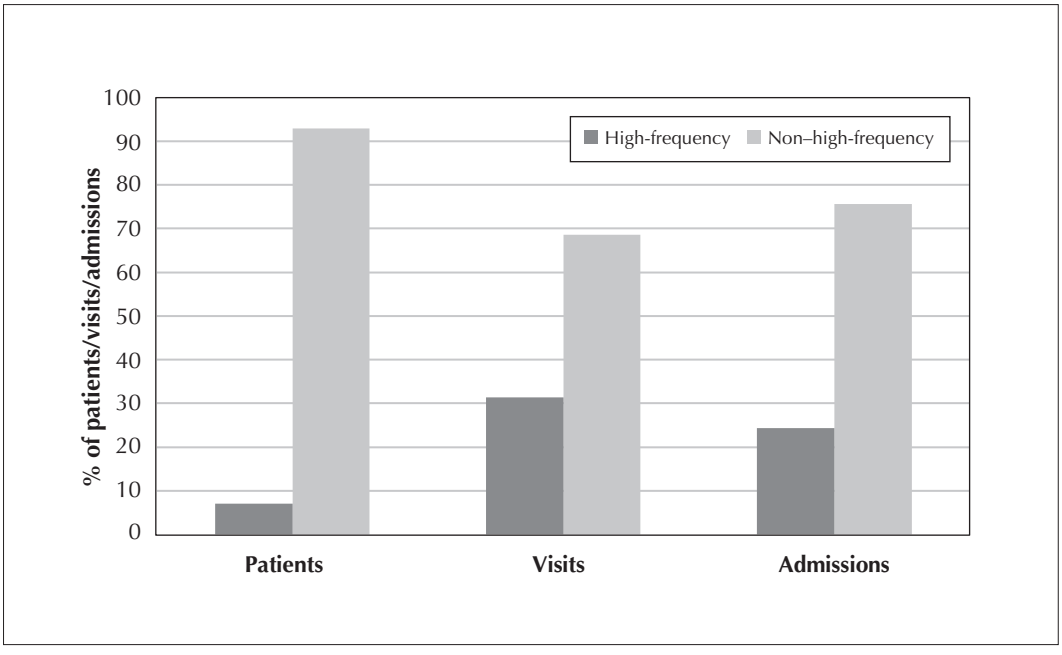


Fig. 2: Emergency department patients, visits and admissions by user category, 2010–2014.

As a proportion of their total visits, high-frequency patients had similar life-threatening presentations, fewer high-acuity (CTAS levels 2–4) visits and significantly more low-acuity visits (CTAS level 5) than non–high-frequency users (Table 1).

Non–high-frequency and high-frequency patients had similar clinical reasons for an emergency department visit, led by respiratory disease and mental health and addiction issues (Fig. 3).

High-frequency users accessed primary care services annually at more than twice the rate as non–high-frequency users (25.3 visits, 95% confidence interval 22.0–28.6, vs. 10.0 visits, 95% confidence interval 9.6–10.4).

Table 1: Acuity of emergency department visits for high-frequency and non–high-frequency users at the Sioux Lookout Meno Ya Win Health Centre, 2010–2014

Canadian Triage and Acuity Scale level	No. (%) of patients: High-frequency *n* = 2398	No. (%) of patients: Non–high-frequency *n* = 31 037	*p* value
1 (resuscitation)	5 (0.2)	93 (0.3)	0.01
2 (emergent)	98 (4.1)	1458 (4.7)	< 0.001
3 (urgent)	666 (27.8)	10 149 (32.7)	< 0.001
4 (less urgent)	982 (41.0)	15 230 (49.1)	< 0.001
5 (nonurgent)	621 (25.9)	3880 (12.5)	< 0.001
Not available	26 (1.1)	217 (0.7)	0.1

Females outnumbered males ($p < 0.001$) in both user groups, constituting 59.7% (1432) of high-frequency emergency department visitors and 53.1% (16 481) of non–high-frequency visitors (Table 2).

Most patients (69 465 [86.6%]) were self-referred or referred from a nursing station (including schedivac); 4670 (5.8%) arrived by land ambulance. Air ambulance medivac patients accounted for 6077 (7.6%) of emergency department visits.

DISCUSSION

High-frequency emergency department use is an important issue for rural hospitals. We document the substantial contribution of high-frequency users to the workload in a rural emergency department. The annual rate of emergency department use per 100 population, 55.3, is higher than the provincial rate of 44 but is comparable to other rural estimates, which range from 51 to 90.[8–10]

In the current study, 7.2% of emergency department patients with 6 or more annual visits accounted for 31.3% of emergency department visits. These values are comparable to 2016 Ontario values of 8.9% and 29.3%, respectively.[1] The situation is unlikely to change, as high-frequency emergency department use at SLMHC was stable during the 5-year study period.

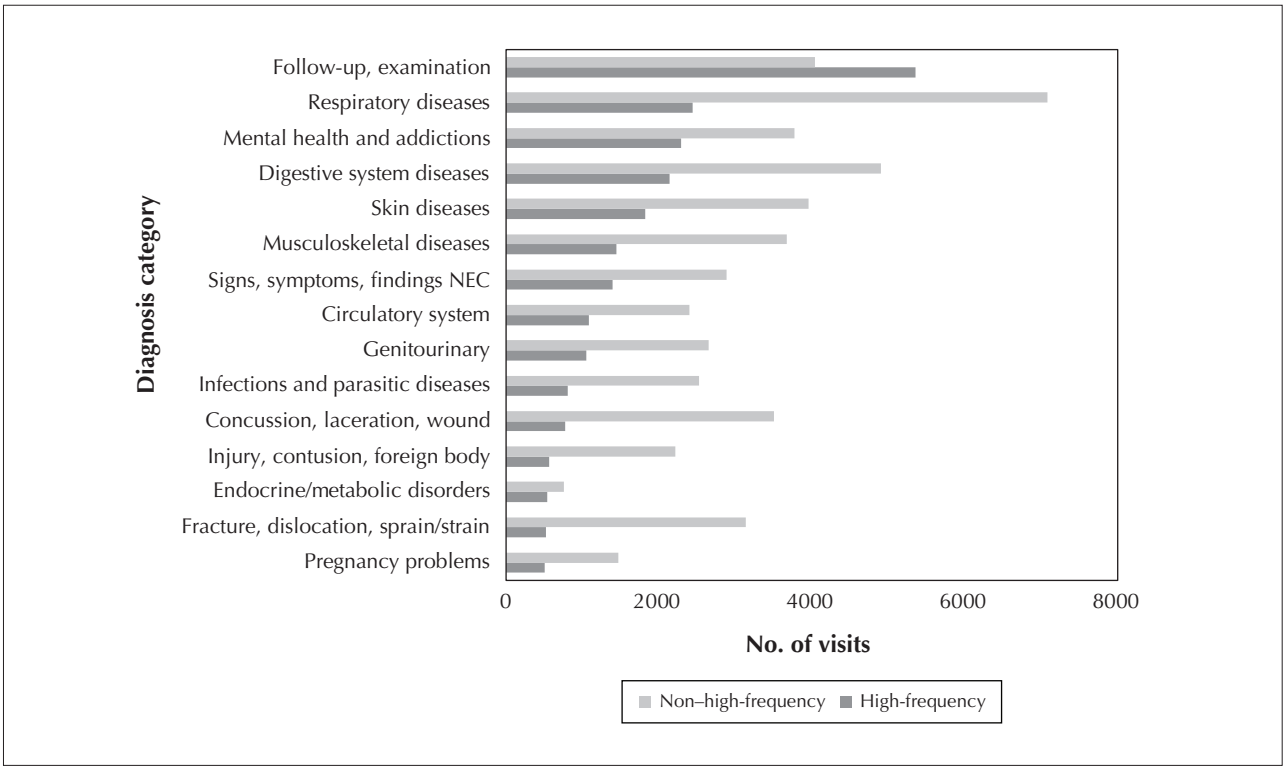


Fig. 3: Top 15 International Statistical Classification of Diseases and Related Health Problems, 10th revision diagnoses of emergency department visits by user category, 2010–2014. Note: NEC = not elsewhere classified.

Table 2: Age and sex distribution of high-frequency and non–high-frequency users

	No. (%) of patients			
	Non–high-frequency		High-frequency	
Age, yr	Female	Male	Female	Male
≤ 18	4748 (15.3)	4500 (14.5)	247 (10.3)	185 (7.7)
19–64	10 243 (33.0)	8783 (28.3)	1023 (42.7)	676 (28.2)
≥ 65	1490 (4.8)	1273 (4.1)	161 (6.7)	106 (4.4)
Total	16 481 (53.1)	14 556 (46.9)	1431 (59.7)	967 (40.3)

The perception by some physicians that high-frequency users often present with very low acuity complaints is borne out in this study. However, in many cases, they were sick enough to require admission, albeit with lower admission rates than non–high-frequency users (5.3% vs. 7.6%). High-frequency users cannot be summarily dismissed, and their frequent CTAS level 5 (nonurgent) visits may expose them to a "not-sick" clinical assessment bias. Alternatively, they may present nonurgently for unmet psychosocial needs.

Female emergency department attendees were overrepresented in both user groups, in keeping with the provincial norm.[11]

After we eliminated follow-up examinations (e.g., dressing changes, clinical follow-up, after-hours antibiotic prescriptions), the 2 user groups had a similar frequency of presenting illness, most often respiratory, followed by mental health and addiction issues, and pelvic–abdominal complaints. This pattern differs from the norm: Canada-wide data generally identify respiratory illness as the third most common emergency department presentation.[1] Respiratory illness is common in our region. Overcrowded and inadequate housing in the northern communities of the catchment area contribute to high rates of admission for pneumonia among infants and adults.[12,13]

The second most common emergency department diagnostic category for both user groups was mental health and addiction issues, not generally present in the top 10 reasons for an emergency department visit in other Canadian hospitals.[3] This is not surprising, considering the well-documented regional opioid epidemic and increasing local mental health and addiction service needs.[2,14] A recent study of Ontario emergency department users showed that those with comorbid mental health or addiction issues were significantly more likely to be frequent emergency department patients.[15]

What was surprising in the current study was the rate at which high-frequency emergency department users concurrently accessed primary care services in the province. At an average of 25 office visits to community physicians annually, high-frequency patients obtained elective care more than twice as often as non–high-frequency users. This is in keeping with a 2001 Ontario study, which also documented frequent access of primary health care services by high-frequency emergency department patients.[16] In that study, high-frequency patients (defined as having ≥ 12 annual emergency department visits) accessed primary care an average of 6 times in 1997/98, and half of them had at least 12 office visits. The different definition of high-frequency user precludes a direct comparison with our data. Our findings are consistent with other emergency department studies, which also found increased concurrent use of primary care services by high-frequency emergency department users.[4,17–19] Why is it that such frequent primary care visits do not address patient needs, obviating the need for an emergency department visit? Is access to care not timely enough, or are global needs not adequately addressed in the office setting? There is more to learn here, and qualitative research exploring the perspectives of the high-frequency user is needed.

Characteristics associated with high-frequency emergency department use in other studies include greater burden of chronic and/or psychiatric illness, lower socioeconomic status, lower self-perceived health status and the belief that the emergency department is the appropriate service.[4,17,19–25] We did not access socioeconomic status information, but our primarily First Nations population living in remote communities is known to encounter historical and present social determinants of health: poverty, education, unemployment, homelessness and intergenerational trauma.[26] Off-reserve Aboriginal rates of unemployment are over 30%, and life expectancy is, on average, 5 years lower than the national rate.[27,28]

To respond to the issue of high-frequency emergency department use to better meet the

needs of these patients or to limit the scope of the problem, urban hospitals often institute a case-management approach, with some success.[29–32] Interdisciplinary case-management teams have been effective in reducing emergency department visits, presumably owing to provision of multifaceted care for high-frequency users and better coordination with community services.[29–32] This type of institutional response is resource intensive. A comparable, sustainable rural response might include identifying and resourcing a care provider (physician, nurse practitioner, registered nurse or social worker) to develop a meaningful relationship and regular contact with high-frequency patients. In many rural settings, the same clinicians typically provide both hospital and community care, and coordination of clinical care between hospital-based and primary care services may be less of a barrier. Any intervention will need to recognize local cultural realities.[21] Cultural dispossession, intergenerational trauma and present-day impacts of the social determinants of health for First Nations peoples in northwestern Ontario may require programming not typically associated with either rural or urban hospital care.

Limitations

Our findings may not be generalizable to other rural hospitals, as a substantial proportion (7.6%) of emergency department patients arrived by air ambulance medivac and the geographic catchment area is vast. Many patients had initial triaging and treatment at their community nursing station. A further limitation of our study is the inability to distinguish between referred schedivac patients and local self-referred patients. Also, in using a new definition of rural high frequency (≥ 6 visits annually), our study differs from the large, predominantly urban data sets (National Ambulatory Care Reporting System), which use 4 or more annual visits but identify a similar proportion of emergency department visitors as high-frequency users (about 8%).

CONCLUSION

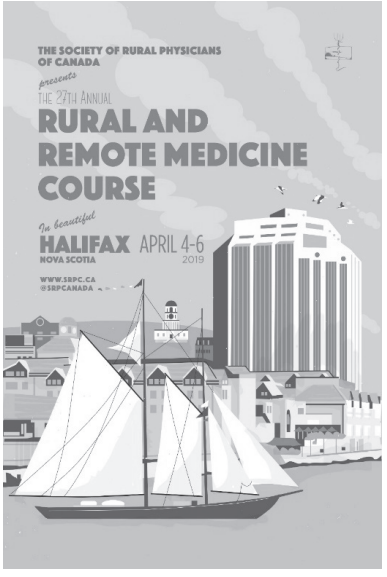
High-frequency emergency department use at SLMHC cannot be interpreted simply and presents several contradictions. Although many low-acuity visits are often labelled as "visits that could be treated in primary care," actual access and use of concurrent primary care services by high-frequency patients were robust. Despite presenting frequently with low-acuity problems, high-frequency users often required admission. Interventions and services will need regional context. Qualitative research may be needed to bring further understanding to the needs of this subset of emergency department patients.

REFERENCES

1. NACRS emergency department visits and length of stay, 2016–2017. Ottawa: Canadian Institute for Health Information. Available: https://www.cihi.ca/en/nacrs-emergency-department-visits-and-length-of-stay-2016-2017 (accessed 2018 Jan. 5).
2. Matsumoto CL, O'Driscoll T, Lawrence J, et al. A 5 year retrospective study of emergency department use in Northwest Ontario: a measure of mental health and addictions needs. *CJEM* 2017;19:381-5.
3. Matsumoto CL, O'Driscoll T, Madden S, et al. Defining 'high-frequency' emergency department use: Does one size fit all for urban and rural areas? *Can Fam Physician* 2017;63:e395-9.
4. Mian O, Pong R. Does better access to FPs decrease the likelihood of emergency department use? Results from the Primary Care Access Survey. *Can Fam Physician* 2012;58:e658-66.
5. Altmayer CA, Ardal S, Woodward GL, et al. Variation in emergency department visits for conditions that may be treated in alternative primary care settings. *CJEM* 2005;7:252-6.
6. LaCalle EJ, Rabin EJ, Genes NG. High-frequency users of emergency department care. *J Emerg Med* 2013;44:1167-73.
7. Locker TE, Baston S, Mason SM, et al. Defining frequent use of an urban emergency department. *Emerg Med J* 2007;24:398-401.
8. Rourke JT, Kennard M. Emergency patient transfer from rural hospitals: a regional study. *CJEM* 2001;3:296-301.
9. Vlahaki D, Milne WK. Meeting Canadian emergency department triage and acuity scale benchmarks in a rural emergency department. *Can J Rural Med* 2009;14:101-4.
10. Harris L, Bombin M, Chi F, et al. Use of the emergency room in Elliot Lake, a rural community of Northern Ontario, Canada. *Rural Remote Health* 2004;4:240.
11. NACRS emergency department visits, by sex, age group and province,* 2010–2011 [table]. Ottawa: Canadian Institute for Health Information. Available: www.cihi.ca/sites/default/files/document/nacrs_quickstats_2010-2011_en.pdf (accessed 2018 Jan. 12).
12. McCuskee S, Kirlew M, Kelly L, et al. Bronchiolitis and pneumonia requiring hospitalization in young first nations children in Northern Ontario. *Pediatr Infect Dis J* 2014;33:1023-6.
13. Poling J, Kelly L, Chan C, et al. Hospital admission for community-acquired pneumonia in a First Nations population. *Can J Rural Med* 2014;19:135-41.
14. *Resolution: 09/92. Prescription drug abuse state of emergency*. Thunder Bay (ON): Nishnawbe Aski Nation; 2009.
15. Hensel JM, Taylor VH, Fung K, et al. Unique characteristics of high-cost users of medical care with comorbid mental illness or addiction in a population-based cohort. *Psychosomatics* 2018;59:135-43.
16. Ovens HJ, Chan BT. Heavy users of emergency services: a population-based review. *CMAJ* 2001;165:1049-50.
17. Vinton DT, Capp R, Rooks SP, et al. Frequent users of US emergency departments: characteristics and opportunities for intervention. *Emerg Med J* 2014;31:526-32.
18. Palmer E, Leblanc-Duchin D, Murray J, et al. Emergency department use: Is frequent use associated with a lack of primary provider? *Can Fam Physician* 2014;60:e223-9.
19. Tranquada KE, Denninghoff KR, King ME, et al. Emergency department workload increase: Dependence on primary care? *J Emerg Med* 2010;38:279-85.

20. Hardie TL, Polek C, Wheeler E, et al. Characterizing emergency department high-frequency users in a rural hospital. *Emerg Med J* 2015;32:21-5.
21. Khan Y, Glazier RH, Moineddin R, et al. A population-based study of the association between socioeconomic status and emergency department utilization in Ontario, Canada. *Acad Emerg Med* 2011;18:836-43.
22. Han A, Ospina M, Blitz SB, et al. Patients presenting to an emergency department: the use of other health care services and reasons for presentation. *CJEM* 2007;9:428-34.
23. Birmingham LE, Cochran T, Frey JA, et al. Emergency department use and barriers to wellness: a survey of emergency department frequent users. *BMC Emerg Med* 2017;17:16.
24. Mehl-Madrona LE. Prevalence of psychiatric diagnoses among frequent users of rural emergency medical services. *Can J Rural Med* 2008;13:22-30.
25. Matthews R. The cultural erosion of Indigenous peoples in health care. *CMAJ* 2017;189:E78-9.
26. Richmond CA, Ross NA. The determinants of First Nation and Inuit health: a critical population health approach. *Health Place* 2009; 15:403-11.
27. Chart 13: Projected life expectancy at birth by sex, by Aboriginal identity, 2017. Ottawa: Statistics Canada; 2015. Available: www.statcan.gc.ca/pub/89-645-x/2010001/life-expectancy-esperance-vie-eng.htm (accessed 2018 Mar. 25).
28. Moyser M. *Aboriginal People living off-reserve and the labour market: estimates from the labour force survey, 2007–2015*. Ottawa: Statistics Canada; 2017.
29. Kumar GS, Klein R. Effectiveness of case management strategies in reducing emergency department visits in frequent user patient populations: a systematic review. *J Emerg Med* 2013; 44:717-29.
30. Althaus F, Paroz S, Hugli O, et al. Effectiveness of interventions targeting frequent users of emergency departments: a systematic review. *Ann Emerg Med* 2011;58:41-52.e42.
31. Morgan SR, Chang AM, Alqatari M, et al. Non-emergency department interventions to reduce ED utilization: a systematic review. *Acad Emerg Med* 2013;20:969-85.
32. Stergiopoulos V, Gozdzik A, Tan de Bibiana J, et al. Brief case management versus usual care for frequent users of emergency departments: the Coordinated Access to Care from Hospital Emergency Departments (CATCH-ED) randomized controlled trial. *BMC Health Serv Res* 2016;16:432-41.

Competing interests: None declared.



The 27th Annual Rural and Remote Medicine Course
in Halifax, NS. April 4–6, 2019

REGISTER NOW!

Early bird deadline is
November 1st, 2018

More details online **www.srpc.ca/events**

More than 160 sessions, small group sessions, hands-on workshops and Rural Critical Care modules.

A family-friendly (day care included) collegial atmosphere.

What people have said about past R&R Conferences:

- *It's hard to decide which sessions to go to with so many good choices.*
- *As a student it gave me an idea of the challenges facing rural docs today.*
- *Relevant peer teaching!*
- *Enjoy meeting old friends and colleagues and making new connections.*
- *The child care was excellent*
- *SRPC staff excellent, friendly,and welcoming as usual.*
- *Each year it gets better.*