


BMJ Open Quality Evaluating emergency department transfers from urgent care centres: insights for paramedic integration with subacute healthcare

Ryan P Strum ¹, Fabrice I Mowbray,^{1,2} Shawn E Mondoux,³ Andrew P Costa^{1,4}

To cite: Strum RP, Mowbray FI, Mondoux SE, *et al.* Evaluating emergency department transfers from urgent care centres: insights for paramedic integration with subacute healthcare. *BMJ Open Quality* 2023;**12**:e002160. doi:10.1136/bmjopen-2022-002160

Received 17 October 2022
Accepted 24 February 2023



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Health Research, Evidence and Impact, McMaster University, Hamilton, New Zealand, Canada

²College of Nursing, Michigan State University, East Lansing, Michigan, USA

³Medicine, Division of Emergency Medicine, McMaster University, Hamilton, New Zealand, Canada

⁴Medicine, McMaster University, Hamilton, New Zealand, Canada

Correspondence to

Mr Ryan P Strum;
strumr@mcmaster.ca

ABSTRACT

Objective Paramedics redirecting non-emergent patients from emergency departments (EDs) to urgent care centres is a new and forthcoming strategy to reduce overcrowding and improve primary care integration. Which patients are likely not suitable for paramedic redirection are unknown. To describe and specify patients inappropriate for urgent care centres, we examined associations between patient characteristics and transfer to the ED after patients initially presented to an urgent care centre.

Methods A population-based retrospective cohort study of all adult (≥ 18 years) visits to an urgent care centre from 1 April 2015 to 31 March 2020 in Ontario, Canada. Binary logistic regression was used to determine unadjusted and adjusted associations between patient characteristics and being transferred to an ED using OR and 95% CIs. We calculated the absolute risk difference for the adjusted model.

Results A total of 1 448 621 urgent care visits were reported, with 63 343 (4.4%) visits transferred to an ED for definitive care. Being 65 years and older (OR 2.29, 95% CI 2.23 to 2.35), scored an emergent Canadian Triage and Acuity Scale of 1 or 2 (OR 14.27, 95% CI 13.45 to 15.12) and higher comorbidity count (OR 1.51, 95% CI 1.46 to 1.58) had added odds of association with being transferred out to an ED.

Conclusion Readily available patient characteristics were independently associated with interfacility transfers between urgent care centres and the ED. This study can support paramedic redirection protocol development, highlighting which patients may not be best suited for ED redirection.

INTRODUCTION

Canadian emergency departments (EDs) are facing a pervasive crisis. In various regions across Canada, hospitals have been forced to close their EDs, or particular services, for a period of time.¹ Shortage in healthcare staffing and increased visitation are contributors to this phenomenon, all leading to a healthcare calamity with extensive ED overcrowding.^{2–4} Ontario is a strong example, reporting its highest-ever wait times to see an ED physician (2.1 hours) and time to admission from the ED (20.1 hours).⁵

New care models are being prioritised to reduce ED overcrowding and increase integration with primary care services. Using paramedics to transport non-emergent patients to urgent care centres instead of ED's is probable, though little is known about which patients could be suitable.⁶ There is negligible research to inform this new paramedic direction care model, as Canadian paramedics transport exclusively to the ED. Inappropriate ED redirection could result in worse health outcomes and delayed care for time-sensitive clinical conditions, and likely would result in an interfacility transfer to an ED. To support the triage of patients in the community and future redirection protocol development, we evaluated associations between patient characteristics and interfacility transfers from urgent care to the ED.

METHODS

We conducted a population-based retrospective cohort study by analysing administrative records from the National Ambulatory Care Reporting System (NACRS) database. All adult patients (≥ 18 years) triaged in an Ontario urgent care centre between 1 April 2015 to 31 March 2020 were included; representing the most recent 5-year period prior to the COVID-19 pandemic. NACRS is a hospital-based and community-based ambulatory care administrative database that collects data on every patient's urgent care and ED visit at the time of service.⁷

All patient characteristics included in this study were measured and recorded during the urgent care visit and selected based on the prior literature, clinical judgement and data availability.^{8 9} Characteristics included sex, age, access to primary care, triage acuity, referral source, comorbidities, primary diagnostic category, geographical location and visit outcome. Variables were collapsed into ordinal categories to facilitate model stability

Table 1 Descriptive statistics, unadjusted and adjusted associations, and absolute risk differences between patient characteristics and urgent care visits transferred to the emergency department (ED) in Ontario, Canada, 1 April 2015 to 31 March 2020

	All urgent care visits, n (%)	Urgent care visits transferred to ED, n (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Absolute risk % (95% CI)*
Total visits	1 448 621	63 343			
Visit outcome					
Discharged	1 368 323 (94.5)	–			
Transferred to ED	63 343 (4.4)	63 343 (100.0)			
Other	16 995 (1.2)	–			
Sex					
Male	617 372 (42.6)	28 501 (45.0)	Ref	Ref	–
Female	831 249 (57.4)	34 842 (55.0)	1.11 (1.09 to 1.12)	1.18 (1.16 to 1.20)	0.7 (0.7 to 0.7)
Age group, years					
18–39	546 893 (37.8)	14 616 (23.1)	Ref	Ref	–
40–64	581 833 (40.2)	23 818 (37.6)	1.55 (1.52 to 1.59)	1.38 (1.35 to 1.41)	1.4 (1.3 to 1.4)
65–105	319 895 (22.1)	24 909 (39.3)	3.08 (3.01 to 3.14)	2.29 (2.23 to 2.35)	4.1 (4.0 to 4.2)
Triage, CTAS					
1 or 2†	118 793 (8.2)	23 823 (37.6)	26.17 (24.72 to 27.70)	14.27 (13.45 to 15.12)	21.2 (20.7 to 21.8)
1	1335 (0.1)	876 (1.4)	–	–	–
2	117 458 (8.1)	22 947 (36.2)	–	–	–
3	546 149 (37.7)	30 774 (48.6)	6.22 (5.89 to 6.59)	4.24 (4.01 to 4.49)	5.9 (5.8 to 6.1)
4	649 273 (44.8)	7470 (11.8)	1.21 (1.14 to 1.29)	1.14 (1.07 to 1.21)	0.5 (0.3 to 0.8)
5	134 406 (9.3)	1276 (2.0)	Ref	Ref	–
Access to primary healthcare					
Yes	1 315 978 (90.8)	58 761 (92.8)	1.31 (1.27 to 1.35)	0.99 (0.96 to 1.03)	0.0 (–0.2 to 0.1)
No/unknown	132 643 (9.2)	4582 (7.2)	Ref	Ref	–
Referral source					
Self-referred	1 351 341 (93.3)	58 879 (93.0)	0.84 (0.81 to 0.88)	0.85 (0.81 to 0.89)	–0.7 (–1.0 to –0.5)
Ambulatory care service	49 416 (3.4)	2001 (3.1)	0.78 (0.73 to 0.83)	1.12 (1.05 to 1.20)	0.5 (0.2 to 0.8)
Other	47 864 (3.3)	2463 (3.9)	Ref	Ref	–
Geographical location					
Urban	1 374 430 (94.9)	60 338 (95.3)	1.09 (1.05 to 1.13)	1.07 (1.03 to 1.12)	0.3 (0.1 to 0.4)
Rural	70 469 (4.9)	2861 (4.5)	Ref	Ref	–
Unknown	3722 (0.2)	144 (0.2)	–	–	–
Comorbidity†					
0	667 123 (46.1)	20 715 (32.7)	Ref	Ref	–

Continued

Table 1 Continued

	All urgent care visits, n (%)	Urgent care visits transferred to ED, n (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Absolute risk % (95% CI)*
1	441 435 (30.5)	18 660 (29.5)	1.38 (1.35 to 1.41)	1.07 (1.05 to 1.10)	0.3 (0.2 to 0.4)
2	202 348 (14.0)	12 565 (19.8)	2.07 (2.02 to 2.11)	1.20 (1.17 to 1.23)	0.8 (0.7 to 0.9)
3	90 552 (6.3)	6929 (10.9)	2.59 (2.51 to 2.66)	1.34 (1.30 to 1.39)	1.4 (1.2 to 1.6)
4–8	47 163 (3.3)	4474 (7.1)	3.27 (3.16 to 3.38)	1.51 (1.46 to 1.58)	2.1 (1.9 to 2.4)
Diagnostic category, ICD-10§					
Factors influencing health status and contact with health Services	68 761 (4.7)	484 (0.8)	0.32 (0.29 to 0.35)	0.41 (0.37 to 0.44)	–2.6 (–2.8 to –2.5)
Certain infectious diseases	59 478 (4.1)	1399 (2.2)	1.07 (1.02 to 1.13)	0.93 (0.87 to 0.98)	–0.3 (–0.5 to –0.1)
Diseases of the eye, adnexa, ear and mastoid process	84 936 (5.9)	859 (1.4)	0.46 (0.42 to 0.49)	0.34 (0.32 to 0.36)	–3.0 (–3.1 to –2.9)
Diseases of the respiratory system	160 635 (11.1)	4266 (6.7)	1.22 (1.17 to 1.26)	0.94 (0.90 to 0.97)	–0.2 (–0.4 to –0.1)
Diseases of the digestive system	64 925 (4.5)	8440 (13.3)	6.70 (6.46 to 6.88)	4.82 (4.66 to 4.98)	12.0 (11.7 to 12.5)
Diseases of the skin and subcutaneous tissue	91 297 (6.3)	1089 (1.7)	0.54 (0.51 to 0.57)	0.57 (0.54 to 0.61)	–1.9 (–2.0 to –1.7)
Diseases of the musculoskeletal system and connective tissue	142 323 (9.8)	1552 (2.5)	0.49 (0.47 to 0.52)	0.42 (0.40 to 0.44)	–2.7 (–2.8 to –2.6)
Tissue					1.1 (0.7 to 1.2)
Diseases of the genitourinary system	89 448 (6.2)	3072 (4.8)	1.59 (1.52 to 1.66)	1.25 (1.19 to 1.30)	4.9 (4.7 to 5.0)
Symptoms, signs and abnormal clinical and laboratory findings	213 601 (14.7)	20 670 (32.6)	4.78 (4.66 to 4.91)	2.49 (2.42 to 2.56)	
Injury, poisoning and certain other consequences of external causes	385 039 (26.6)	8437 (13.3)	Ref	Ref	–
Other†	147 656 (10.2)	13 348 (21.1)	4.85 (4.72 to 4.99)	4.27 (4.14 to 4.40)	9.4 (9.1 to 9.7)
Neoplasms	1476 (0.1)	273 (0.4)	–	–	
Disorders of blood involving immune system	4199 (0.3)	650 (1.0)	–	–	
Endocrine, nutrition and metabolic disorders	7948 (0.5)	1162 (1.8)	–	–	
Mental and behavioural disorders	14 152 (1.0)	1509 (2.4)	–	–	

Continued

Table 1 Continued

	All urgent care visits, n (%)	Urgent care visits transferred to ED, n (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Absolute risk % (95% CI)*
Diseases of nervous system	17 026 (1.2)	1034 (1.6)	-	-	
Diseases of the circulatory system	29 784 (2.1)	7335 (11.6)	-	-	
Pregnancy, childbirth and the puerperium	13 239 (0.9)	1094 (1.7)	-	-	
Certain conditions origination in the perinatal period	7 (0.0)	2 (0.0)	-	-	
Congenital malformations, deformations and	289 (0.0)	9 (0.0)	-	-	
Chromosomal abnormalities					
External coucals of morbidity and mortality	68 (0.0)	7 (0.0)	-	-	
Intercept				0.01 (0.01 to 0.01)	
Concordance statistic†‡				0.84 (0.84 to 0.85)	

*Adjusted model.
†Combined into 'CTAS 1 and 2' and 'other' category due to small cell sizes.
‡Total of comorbidities present at urgent care visit, included: hypertension, diabetes, chronic obstructive pulmonary disease, asthma, rheumatoid arthritis, congestive heart failure, bowel disease, cancer.
§Represents primary diagnosis of urgent care visit.
¶Reported as the area under the receiver operating characteristic curve (95% CI).
‡‡CTAS, Canadian Triage and Acuity Scale; ICD-10, International Statistical Classification of Diseases 10th Revision.

when data were non-continuous and small cell sizes (<3% of cohort). Triage acuity was assigned using the Canadian Triage and Acuity Scale (CTAS); an ordinal scale ranging from 1 to 5.¹⁰ Main diagnoses were assigned by the attending physician using the International Statistical Classification of Diseases and Related Health Problems, 10th revision. Comorbidities were recorded as pre-existing diagnoses at time of visit and included hypertension, diabetes, chronic obstructive pulmonary disease, asthma, rheumatoid arthritis, congestive heart failure, bowel disease and cancer. Referral source constitutes the service that referred the patient to an urgent care centre, including ambulatory care (ie, physician offices, specialty clinics) or self-referral (patient refers oneself).

Descriptive statistics were reported using measures of frequency and proportions. Multivariable binary logistic regression was used to calculate independent associations between patient characteristics and a visit outcome of transferred to the ED. Results were reported as unadjusted and adjusted ORs of each characteristic with corresponding 95% CIs. Adjusted ORs were used to calculate the absolute risk difference (RD) with 95% CIs.

RESULTS

Table 1 shows the descriptive statistics and analyses of this study. Our cohort contained 1448621 urgent care visits, with 1368323 (94.5%) visits discharged, 63343 (4.4%) transferred to ED and 16995 (1.2%) another visit outcome. Overall, the majority of visitors were female (57.4), younger (18–64 years, 78%) and triaged with either an urgent or less urgent acuity (37.7%; 44.8%).

Urgent care visits transferred to an ED were independently associated with the female sex (OR 1.18, 95% CI 1.16 to 1.20), older age (40–64 years, OR 1.38, 95% CI 1.35 to 1.41; 65–105 years, OR 2.29, 95% CI 2.23 to 2.35) and higher triage acuity (CTAS 1 or 2, OR 14.27, 95% CI 13.45 to 15.12; CTAS 3, OR 4.24, 95% CI 4.01 to 4.49). Odds of being transferred to an ED increased with the number of comorbidities (OR 1.07–1.51). Four diagnostic categories showed significant association with ED transfers, including diseases of the digestive system (OR 4.82, 95% CI 4.66 to 4.98) and genitourinary system (OR 1.25, 95% CI 1.19 to 1.30). Overall the area under the receiver operating characteristic curve was 0.84, supporting this adjusted model is an excellent classifier of patient characteristics.¹¹

DISCUSSION

Our results indicate that readily available patient characteristics were independently associated with interfacility transfers between urgent care to the ED. We identify that emergent medical condition acuity, advanced age, multimorbidity and distinct diagnoses could indicate these patients require clinical management beyond urgent care centre resources. These characteristics are consistent with literature describing clinical and non-clinical features connected with essential ED visits.^{12 13} We postulate

other factors absent from this study could be responsible for transfers to the ED, including longer procedural time, need for advanced diagnostic imaging and visits presenting to urgent care centres near closing hours.

The vast majority of patients visiting an urgent care centre have low acuity conditions, of which only a minuscule proportion are transferred to an ED. These data support an argument urgent care centres have the capacity to manage primary care-like conditions effectively. Identification of this patient cohort in the community by paramedics could reduce ED crowding if transported to urgent care centres directly.⁸ Our findings can inform future paramedic redirection protocols to target younger patients with low acuity conditions that are relatively healthy for redirection from an ED to an urgent care centre. Older adults and patients with specified diagnostic conditions detailed in this study likely require medical imaging not available in urgent care. Additionally, these patients may have more complex conditions or geriatric syndromes, conditions difficult to differentiate in the community or urgent care, and require more definitive ED care.¹⁴ Given recent announcements from health policy representatives in Canada regarding implementation of new paramedic transport care models, this work is both timely and important to aid stabilisation of the healthcare system.¹⁵ Further research is required to better understand low acuity triaged patients transferred to the ED, and to explore urgent care centres as a means of integrating patients with more primary care.

CONCLUSION

Paramedics redirecting patients from ED's to urgent care centres represents a pragmatic strategy to reduce ED overcrowding and congestion. To inform protocol development of a redirection care model, we identify that specified patient characteristics of older age, higher triage acuity, multimorbidity and certain diagnoses were associated with being transferred to an ED from urgent care centres, showcasing a subgroup of patients who may not be suitable.

Acknowledgements This study was supported by ICES, which is funded by an annual grant from the Ontario Ministry of Health (MOH) and the Ministry of Long-Term Care (MLTC).

Contributors RPS and FIM conceptualised the study objective and methodology. RPS prepared and analysed the data and drafted the manuscript. All authors made contributions to the design of the study, methods, interpretation and manuscript, and agreed to be accountable for all aspects of this manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval ICES's collection and use of NACRS secondary ambulatory data are authorised under Section 45 of Ontario's Personal Health Information Protection Act (PHIPA) as a prescribed entity, which is exempt from review by a Research Ethics Board. The use of the data in this study is authorised under section 45 and approved by ICES's Privacy and Legal Office.

Provenance and peer review Not commissioned; externally peer reviewed.



Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Ryan P Strum <http://orcid.org/0000-0003-1902-4734>

REFERENCES

- 1 Kupfer M. Ottawa-area hospitals monitoring staffing levels after weekend ER closures | CBC news. CBC; 2022. Available: www.cbc.ca/news/canada/ottawa/emergency-department-closures-montfort-carleton-place-1.6545081 [Accessed 27 Aug 2022].
- 2 Affleck A, Parks P, Drummond A, et al. Emergency department overcrowding and access block. *CJEM* 2013;15:359–70.
- 3 Rowe BH, McRae A, Rosychuk RJ. Temporal trends in emergency department volumes and crowding metrics in a Western Canadian Province: a population-based, administrative data study. *BMC Health Serv Res* 2020;20:356.
- 4 Strum RP, Drennan IR, Mowbray FI, et al. Increased demand for paramedic transports to the emergency department in Ontario, Canada: a population-level descriptive study from 2010 to 2019. *CJEM* 2022;24:742–50.
- 5 Health Quality Ontario. Time spent in emergency departments. HQO 2022. Available: www.hqontario.ca/system-performance/time-spent-in-emergency-departments
- 6 Ontario Government. Ontario introduces A plan to stay open: health system stability and recovery [news.ontario.ca]. Available: <https://news.ontario.ca/en/release/1002246/ontario-introduces-a-plan-to-stay-open-health-system-stability-and-recovery> [Accessed 18 Aug 2022].
- 7 Li G, Lau JT, McCarthy ML, et al. Emergency department utilization in the United States and Ontario, Canada. *Acad Emerg Med* 2007;14:582–4.
- 8 Strum RP, Tavares W, Worster A, et al. Emergency department interventions that could be conducted in subacute care settings for patients with nonemergent conditions transported by paramedics: a modified Delphi study. *CMAJ Open* 2022;10:E1–7.
- 9 Purdy S, Griffin T, Salisbury C, et al. Ambulatory care sensitive conditions: terminology and disease coding need to be more specific to aid policy makers and clinicians. *Public Health* 2009;123:169–73.
- 10 Bullard MJ, Unger B, Spence J, et al. Revisions to the Canadian emergency department triage and acuity scale (CTAS) adult guidelines. *CJEM* 2008;10:136–51.
- 11 Balakrishnan N, Colton T, Everitt B, et al. *Applied logistic regression*. John Wiley & Sons, 2013.
- 12 Kreindler SA, Cui Y, Metge CJ, et al. Patient characteristics associated with longer emergency department stay: a rapid review. *Emerg Med J* 2016;33:194–9.
- 13 Strum RP, Tavares W, Worster A, et al. Identifying patient characteristics associated with potentially redirectable paramedic transported emergency department visits in ontario, canada: a population-based cohort study. *BMJ Open* 2021;11:e054625.
- 14 Mowbray F, Brousseau AA, Mercier E, et al. Examining the relationship between triage acuity and frailty to inform the care of older emergency department patients: findings from a large Canadian multisite cohort study. *CJEM* 2020;22:74–81.
- 15 Press TC. Ontario expanding program allowing paramedics to take patients to places other than ER | CBC news [CBC]. 2022. Available: www.cbc.ca/news/canada/toronto/ontario-to-expand-paramedicine-1.6553701 [Accessed 8 Sep 2022].