ORIGINAL ARTICLE

Trauma experiences of rural practitioners: A self assessment

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Abstract

Introduction: The purpose of this study was to identify, through self-assessment, how comfortable rural emergency medicine (EM) physicians are in treating critically ill trauma patients, the resources available to treat such patients and their comfort with performing trauma procedures.

Methods: An anonymous self-assessment survey was e-mailed to family physicians practising rural EM in Saskatchewan regarding training, hospital resources, demographics and self-reported comfort with rural trauma management. We included physicians who had provided EM care within the past year in Saskatchewan outside of the major trauma centres. Comfort was measured on a Likert scale.

Results: One hundred thirteen physicians out of a total of 479 physicians contacted agreed to participate (23.6%). Thirty-nine percent (n = 31) of respondents were comfortable with paediatric trauma, and 46% (n = 37) were comfortable with vascular trauma. Nineteen percent (n = 15) were comfortable with pericardiocentesis and 25% (n = 19) were comfortable with cricothyroidotomy. In the past 12 months, 21% (n = 17) had performed paediatric endotracheal intubation, 1.3% (n = 1) had performed cricothyroidotomy, 28.8% (n = 23) had performed needle thoracentesis and 20% (n = 16) had performed central venous line access. Those who did their residency training outside of Canada were more comfortable with overall trauma care. Those who had taken emergency department echo were generally more comfortable with trauma procedures. Those who had current advanced trauma life support were more comfortable with less frequently encountered aspects of trauma care.

Conclusions: This self-assessment helped us identify which aspects of rural trauma medicine are the most challenging for rural practitioners. It gave us an understanding of the procedures related to trauma medicine that are the most difficult, which critical resources are available and where training could be focused to benefit rural emergency physicians.

Keywords: Rural, self-assessment, trauma

Résumé

Introduction: Cette étude avait pour but d'identifier, par l'entremise d'une auto-évaluation, l'aisance des urgentologues en milieu rural à traiter les patients polytraumatisés en état critique, les ressources disponibles pour traiter ces patients et l'aisance avec laquelle ils exécutent les interventions de traumatologie.

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Méthodes: Un questionnaire d'auto-évaluation anonyme a été envoyé par courriel aux médecins de famille qui pratiquent dans les services d'urgence ruraux de la Saskatchewan; le questionnaire portait sur la formation, les ressources hospitalières, les paramètres démographiques et l'aisance rapportée par les répondants quant à la prise en charge des traumatismes en milieu rural. Nous avons inclus les médecins qui avaient dispensé dans l'année écoulée des soins d'urgence à l'extérieur des grands centres de traumatologie en Saskatchewan. L'aisance était mesurée sur une échelle Likert.

Résultats: Sur un total de 479 médecins contactés, 113 ont consenti à participer (23.6%). Trente-neuf pour cent (n = 31) des répondants étaient à l'aise avec les traumatismes pédiatriques et 46% (n = 37) avec les traumatismes vasculaires. Dix-neuf pour cent (n = 15) étaient à l'aise avec la ponction péricardique et 25% (n = 19) avec la cricothyroïdotomie. Dans les 12 mois écoulés, 21% (n = 17) avaient exécuté une intubation endotrachéale pédiatrique, 1.3% (n = 1) une cricothyroïdotomie, 28,8% (n = 23) une thoracentèse à l'aiguille et 20% (n = 16) un accès veineux central. Les médecins qui avaient reçu leur formation en résidence à l'extérieur du Canada étaient plus à l'aise avec les soins de traumatologie en général. Les médecins qui avaient suivi le cours d'échographie du département d'urgence étaient en général plus à l'aise avec les interventions de traumatologie. Les médecins qui avaient une certification advanced trauma life support étaient plus à l'aise avec les aspects moins fréquents des soins de traumatologie.

Conclusions: Cette auto-évaluation nous a aidés à déterminer quels aspects de la médecine de traumatologie rurale sont les plus problématiques pour les praticiens en milieu rural. Elle nous a permis de comprendre quelles sont les interventions de traumatologie qui sont les plus difficiles, quelles ressources essentielles sont disponibles et sur quels aspects la formation doit se concentrer pour profiter aux urgentologues en milieu rural.

Mots-clés: prise en charge des traumatismes en milieu rural, médecine de traumatologie rurale, Trauma, rural, médecine d'urgence

INTRODUCTION

Trauma is the leading cause of death globally during the first 40 years of life.[1] It is also the number one cause of mortality in the paediatric population, with an increase in mortality in rural compared with urban environments.[2] According to the Canada Health Act, provinces are required to provide equal and universal access to health services for all their citizens. This presents a challenge in trauma, where care must be delivered effectively and expeditiously.[3] Rural trauma care can be complicated by geography, weather, distances, lack of resources or lack of expertise.[4]

A disproportionate amount of emergency care is delivered in rural centres, making it difficult to assure the availability of emergency medical expertise.[5] In Canada, almost one-quarter of the population lives over an hour's drive from a major trauma centre.[6,7] Rural citizens live with significantly more risk than their urban counterparts.[4] There is a higher mortality rate for trauma patients pre-hospital and in emergency department (ED) in rural hospitals compared to major urban centres.[6]

Rural inhabitants have twice the rate of trauma-related deaths compared to urban inhabitants, and the relative risk of dying from a motor vehicle collision in a rural community compared to an urban centre is 15:1.[4,8] Rural environments often have small hospitals with few resources for the evaluation and management of a trauma patient, and ED providers may also have limited trauma experience.[9] A clear divide exists among urban and rural communities that all provinces must narrow.[7,10,11]

Despite lack of consensus with regard to its validity, the 'golden hour' is recognised as the time in which patients should receive emergency medical care in trauma to minimise the risk of serious health outcomes and death.[3,7,8,12-14] Lack of resources in rural areas means an increased rate of transfers to major urban centres to receive this care.[6] In some rural and remote communities, there are no trained ED providers, meaning the longer the distance from a major urban centre, the lower the level of training and the greater need for transfer.[5,10,11]

In one study, inappropriate care was given to 60% of trauma victims who reached a rural ED, with errors in airway management, managing chest trauma, inadequate fluid resuscitation and lack of early operative interventions being among the most common.[12] Rural EDs have limited access to medical consultants, surgeons and

intensivists.[5] As well, rural hospitals have limited access to computed tomography (CT) scanners and diagnostics; in the province of Saskatchewan, there are 15 CT scanners servicing the whole population.[8,15] Potential gaps in skills for treating paediatric, orthopaedic, vascular, blunt chest and abdominal trauma are related to the infrequency with which rural providers are confronted by these problems.[9] Lower patient volumes, lower rates of procedures and infrequent exposure to critically ill patients may also present difficulties for rural physicians in maintaining skills and knowledge.[5] Many ED providers in rural environments may see fewer than 5 patients per year with severe trauma.[4] In some hospitals, advanced trauma life support (ATLS) is not a requirement for working in their EDs.[16] Many ED providers have difficulty getting timely access to specialists in trauma centres for assistance, due to deficiencies in provincial trauma system development and communication.[17]

In a report released by the College of Physicians and Surgeons of Ontario in 2018, the adequacy of emergency medicine (EM) in smaller centres and rural communities in Canada was called into question. The report suggested guidelines mandating that rural family physicians practising EM without additional certification should undergo additional training and supervision.[18] A response by the College of Family Physicians argued that these new guidelines would lead to fewer family physicians working in rural and already underserved communities and expose rural communities to reduced access to much-needed services; they argued that specific checklists of critical skills, supervised for a target number of experiences is unobtainable given the low volume of high-acuity cases and does not reflect competency.[19]

The purpose of this study is to identify through self-assessment how comfortable rural EM practitioners are in treating critically ill trauma patients, the resources they have available and their ability to perform trauma-related procedures. We hope that by answering some of these questions, we can identify areas of rural trauma medicine that can be enhanced in Saskatchewan.

METHODS

This was a cross-sectional online survey created by the Survey Monkey software. An e-mail was sent to physicians practising family medicine in Saskatchewan. They were identified through the Saskatchewan Medical Association database of active family physicians. Our inclusion criteria were family physicians currently providing EM care, or who had provided EM care in the past year to rural communities within Saskatchewan. Rural was classically assumed to be a community size of <10,000 people as per Statistics Canada's definition.[20] However, for our study purposes, physicians were excluded if they worked in Saskatoon and Regina and/or if they practised full-time EM.

An e-mail was sent out with the link to the survey, titled 'Trauma experiences of rural emergency physicians: A self-assessment'. The survey started with a consent followed by 18 questions. The survey was an anonymous self-assessment asking questions related to demographics, training, hospital resources and self-reported comfort with specific trauma-related management. Data collection ran from 1st January 2019 to 31st March 2019. All data and responses were deidentified prior to analysis.

Analysis was done by the Clinical Research support Unit at the University of Saskatchewan. Descriptive statistics were provided to describe the respondents collectively. These included frequencies with proportions. Levels of comfort were dichotomised into comfortable or not comfortable from a 5-point Likert scale and then described as frequencies with proportions. Comfort levels were summarised as average values as rated on the 5-point Likert scale, with an average score for each participant calculated from across their responses within each domain of trauma, with an overall mean and median score calculated. Mean comfort levels for each domain were compared with subgroups within the potential predictors of catchment population, number of patients seen in the ED, age and place of training using the *t*-test or analysis of variance. Logistic regression was used for assessing the relationship between the number of times a specific procedure was performed and the dichotomised comfort level. Univariate analysis was used to identify relationships between basic study characteristics and continuous outcomes. This included analysing each type of trauma and procedure with demographics and training levels of the participants.

Ethics approval was obtained from the University of Saskatchewan Research Ethics Board.

RESULTS

One hundred thirteen physicians (23.6%) of 479 rural physicians contacted agreed to participate. Eighty participants met our inclusion criteria. Sixty-seven per cent were from communities with a population of <10,000 [Figure 1], with 70% reporting <300 emergency room visits per month at their hospital. Most participants were <45 years of age, 57% had completed undergraduate training outside of Canada and 63% had completed residency training within Canada. Most had been practising for more than 2 years [Figure 1]. The majority of participants had current ATLS credentials, however, only 37% had ever completed the emergency department echo (EDE) point-of-care ultrasound course [Figure 2].

Comfort was measured on a 5-point Likert scale that was then converted during analysis to a 2-point scale of comfortable or uncomfortable. When questioned about comfort levels regarding specific types of trauma, only 39% of the respondents were comfortable with paediatric trauma, 46% were comfortable with vascular trauma, 56% were comfortable with spinal cord injuries and 60% were comfortable with genitourinary (GU) trauma [Figure 3]. With regard to trauma-related skills, only 19% of the physicians reported that they were comfortable with pericardiocentesis, and 25% were comfortable with surgical airway procedures [Figure 4]. With regard to skill maintenance, the majority had not performed paediatric endotracheal tube insertion (79%), surgical airways (99%), pericardiocentesis (99%), central venous line (CVL) placement (80%) and needle thoracentesis (71%) within the past 12 months [Figure 5].

Statistically significant relationships were not found between expected variables such as overall comfort with trauma or procedures and size of community, ATLS certification or years in practice [Figure 6].

Figure 1: Physician characteristics

	n (%)
Population of community	
<5000	35 (44)
5000-10,000	18 (23)
>10,000	27 (33)
Number of patients per month	
<100	19 (24)
100-300	37 (46)
>300	22 (28)
Age	
<35	24 (30)
35-44	30 (38)
45-65	23 (29)
>65	3 (4)
Number of years practising	
<2	20 (25)
2-5	22 (38)
>5	38 (48)
Location of undergrad training	
Canada	34 (43)
International	46 (57)
Location of residency training	
Canada	50 (63)
International	30 (37)

DISCUSSION

We believe this is the first study of its kind done in the province of Saskatchewan, however, it is limited by the small sample size. Our results are consistent with the existing literature regarding rural trauma care. In terms of demographics, most of our participants were from a community with <10,000 people and with <300 visits per

Figure 2: Practice setting variables

	n (%)
ATLS certification	
Current	47 (59)
Expired	22 (28)
Never taken	11 (14)
POCUS designation: EDE course	
Current	25 (31)
Expired	5 (6)
Never taken	50 (61)
Resources available	
Radiography	79 (99)
Point-of-care ultrasound	54 (68)
Packed red blood cells	62 (78)
Fresh Frozen Plasma	33 (41)
Platelets	21 (26)
Tranexamic acid	74 (93)

ATLS: Advanced trauma life support, EDE: Emergency department echo, POCUS: Point-of-care ultrasound

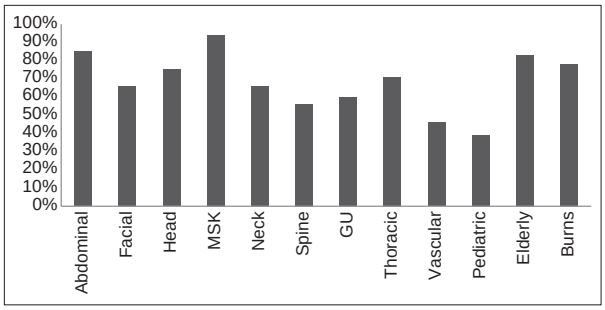


Figure 3: Comfort levels with different types of trauma. MSK= Musculoskeletal; GU=Genitourinary.

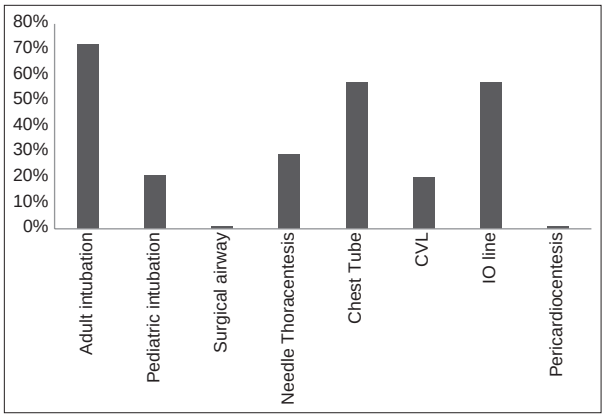


Figure 5: Percent who have performed the procedure in the past year. CVL = Central venous line; IO = Intraosseous.

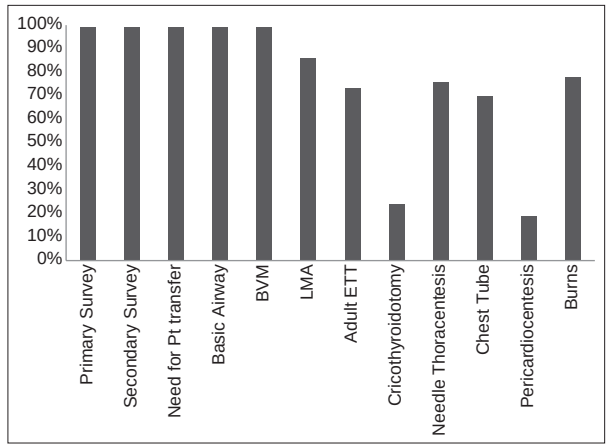


Figure 4: Comfort levels with trauma-related procedures. BVM=Bag valve mask; LMA= Laryngeal mask airways; ETT= Endotracheal Tube.

Figure 6: Physician training characteristics

	Frequency	95% CI
Overall comfort with trauma		
Residency in Canada	50	2.88-3.48
Residency outside of Canada	30	
Comfort with radiography		
<2 years practising	20	2.82-3.34
>2 years practising	60	
Comfort with procedures		
Current POCUS designation	47	3.14-3.73
No POCUS designation	33	
Current ATLS		
Comfortable with SCI	47	2.56-2.98
Uncomfortable with SCI	33	

ATLS: Advanced trauma life support, SCI: Spinal cord injuries, CI: Confidence interval POCUS: Point-of-care ultrasound

month in their ED. This small volume of patients seen in rural and remote EDs could explain the lack of comfort with providing aspects of trauma care. However, because of the lack of additional resources, the need to maintain crucial live-saving procedural skills of ED personnel is even more essential in rural and remote areas.

Our results indicate that doing postgraduate training outside of Canada is associated with increased comfort with trauma management. This may be because of the variation in training programmes for Family Medicine in other countries, and possibly because most Canadian Family Medicine residency training programmes exist in urban centres that do not emphasise rural ED care. Most of the participants had ATLS certification. This could explain why most participants were comfortable with primary survey, secondary survey, transportation of patients and basic airway manoeuvres. Existing literature supports our findings that most participants were uncomfortable with vascular and paediatric trauma, and more than a third of participants were uncomfortable with facial, neck, spine and GU trauma because these types of traumas are less common for rural practitioners. Not unsurprisingly, participants had not done less common procedures such as paediatric endotracheal intubation, needle decompression, chest tube placement or CVL placement in the past 12 months. Maintenance of these skills requires practice, which emphasises the importance of simulation.

Most participants did not have access to fresh frozen plasma (FFP) and platelets in their EDs, which can make it difficult to treat patients with massive haemorrhage. Cost effectiveness, special requirements for storage and lack of transfusion protocols may be the reason FFP and platelets are not available. Although a large proportion of participants did have access to point-of-care ultrasound in their EDs, fewer than half had formal training in using it. Ultrasound training for

the ED and trauma care are widely available and a potential solution for providing effective care in rural areas that do not have access to advanced diagnostic imaging.

Most participants were uncomfortable with surgical airways and pericardiocentesis; these procedures are rare even in larger centres. Almost all participants had not done a surgical airway or pericardiocentesis in the past 12 months. Although these rare, lifesaving procedures are part of the curriculum for courses like ATLS, Family Medicine residency programmes do not expect competency for the above. It would likely be beneficial to practise these procedures in organised trauma-related courses using simulation or cadavers.

Internationally trained rural ED providers were generally more comfortable with trauma, possibly related to increased exposure or a greater emphasis on trauma care during their training outside of Canada. Current point-of-care ultrasound certification was correlated with more comfort in trauma procedures, possibly related to increased comfort with the use of ultrasound and ultrasound-guided procedures. Spinal cord injury and traumatic brain injury may not be as commonly faced, and so maintaining ATLS certification would allow for more recent practice and exposure to these types of trauma. The more endotracheal intubations a practitioner placed, the less comfortable they were, although this is paradoxical; higher volume could increase the chances of facing complications in resource-limited centres which could lead to lower rates of comfort.

Many programmes exist currently for ultrasound certification, therefore encouraging current and new rural ED practitioners to pursue certification could be one way to improve trauma care in resource poor settings. In addition, creating and expanding existing programmes and courses to facilitate practice and retention for less common procedures could also improve rural trauma care. Perhaps enhancing competency-based training in trauma and ED care for Family Medicine residents who plan to work in rural communities could also help. Finally, increasing recruitment and retention for Canadian Family Medicine residents who have certification in added competency in EM could also be a potential solution.

Future research could be conducted to explore the impact of transport time on patient outcomes in Saskatchewan. What resources are necessary in rural hospitals that provide trauma care? What is the mortality difference between urban and rural trauma patients in Saskatchewan? These questions could help expand the current knowledge regarding rural trauma care in Saskatchewan. Consideration could be given to the development of training programmes to supplement what is provided during residency training and in addition to courses such as ATLS and EDE.

CONCLUSIONS

Rural Saskatchewan ED providers were not comfortable with significant areas in trauma management. However, courses such as ATLS and EDE directly improved comfort with aspects of rural trauma care. Obstacles to rural trauma care included lack of resources, low volume and significant lack of exposure to trauma procedures. Our study also found that there was a difference in comfort with trauma care, depending on where postgraduate residency training was completed. This self-assessment helped us to identify which aspects of rural trauma care are the most challenging for practitioners, the procedures related to trauma care that were the most difficult and which critical resources were available to rural trauma ED providers.

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REFERENCES

1. Mozingo D. Access to trauma systems in Canada. Yearb Surg 2011;2011:27-8.
2. Mihalicz D, Phillips L, Bratu I. Urban vs. rural pediatric trauma in Alberta: Where can we focus on prevention? J Pediatr Surg 2010;45:908-11.
3. Lawson FL, Schuurman N, Oliver L, Nathens AB. Evaluating potential spatial access to trauma center care by severely injured patients. Health Place 2013;19:131-7.
4. Ball CG, Sutherland FR, Dixon E, Feliciano DV, Datta I, Rajani RR, *et al.* Surgical trauma referrals from rural level III hospitals: Should our community colleagues be doing more, or less? J Trauma 2009;67:180-4.
5. Martin D, Bekiaris B, Hansen G. Mobile emergency simulation training for rural health providers. Rural Remote Health 2017;17:4057.
6. Fleet R, Tounkara FK, Ouimet M, Dupuis G, Poitras J, Tanguay A, *et al.* Portrait of trauma care in Quebec's rural emergency departments and identification of priority intervention needs to improve the quality of care: A study protocol. BMJ Open 2016;6:e010900.

7. Casey Q. National trauma divide must be narrowed. CMAJ 2010;182:E295-6.
8. Fleet R, Tounkara F, Turcotte S, Ouimet M, Dupuis G, Poitras J, *et al*. P056: Rural versus urban pre-hospital and in-hospital mortality following a traumatic event in Québec, Canada. CJEM 2017;19:S97.
9. Tarighi P, Sherman JE, Mian O, Nathens AB. The importance of tailoring physicians' trauma care training needs in rural environments. Can J Surg 2015;58:423-5.
10. Developing a Rural Health Strategy in Saskatchewan | Project. McMaster Health Forum | Evidence >> Insight >> Action. Available from: https://www.mcmasterforum.org/find-evidence/products/project/developing-a-rural-health-strategy-in-saskatchewan. [Last accessed on 2018 Dec 01].
11. New Brunswick Overhauls Trauma Services – PubMed Central (PMC). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2855935/. [Last accessed on 2021 Oct 31].
12. Helling TS, Davit F, Edwards K. First echelon hospital care before trauma center transfer in a rural trauma system: Does it affect outcome? J Trauma 2010;69:1362-6.
13. Standards of Accessibility and Guidelines for Provision of Sustainable Acute Care Services By Health Authorities – British Columbia. Available from: http://www.health.gov.bc.ca/library/publications/year/2002/acute_accessibility.pdf. [Last accessed on 2021 Oct 31].
14. Quebec Unprepared to Deal with Humboldt-Type Bus Crash in Rural Area: Surgeon. Everything GP; 2018. Available from: https://everythinggp.com/article/522550/prominent-quebec-surgeon-calls-province-start-pre-hospital-helicopter-program. [Last accessed on 2021 Oct 31].
15. Computed Tomography (CT Scans). Government of Saskatchewan. Available from: https://www.saskatchewan.ca/residents/health/accessing-health-care-services/medical-imaging/procedures/ct-or-cat-scan. [Last accessed on 2021 Oct 31].
16. Gomez D, Berube M, Xiong W, Ahmed N, Haas B, Schuurman N, *et al*. Identifying targets for potential interventions to reduce rural trauma deaths: A population-based analysis. J Trauma 2010;69:633-9.
17. Evans CC, Tallon JM, Bridge J, Nathens AB. An inventory of Canadian trauma systems: Opportunities for improving access to trauma care. CJEM 2014;16:207-13.
18. CPSO. Expectations of Physicians Not Certified in Emergency Medicine (EM) Intending to Include EM as Part of their Rural Practice; 2018. Available from: https://www.cpso.on.ca/CPSO/media/documents/Policies/Policy-Items/Expectations-Physicians-Emerg-Med-Rural-Practice.pdf. [Last accessed on 2021 Oct 31].
19. OCPF. CPSO Request for Feedback on "Expectations of Physicians Not Certified in Emergency Medicine Intending to Include Emergency Medicine as Part of Their Practice". Available from: https://www.ontariofamilyphysicians.ca/files/cpso-em-scope-faqs-april-23-18.pdf. [Last accessed on 2021 Oct 31].
20. Du Plessis V, Bashiri R, Bollman R. Definition of Rural. Rural and Small Town Canada Analysis Bulletin. Available from: https://www150.statcan.gc.ca/n1/pub/21-006-x/21-006-x2001003-eng.pdf. [Last accessed on 2021 Oct 31].

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