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Epidemiology and factors associated with mortality among pediatric major trauma patients in Nova Scotia: A 17-year retrospective analysis

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A R T I C L E I N F O

Keywords:
Trauma
Epidemiology
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A B S T R A C T

Background: Major traumatic injury in the pediatric population requires further evaluation to improve patient outcomes. Relatively few Canadian studies have investigated pediatric trauma using population-based data. Our objectives were to describe the epidemiology of pediatric major trauma in Nova Scotia and identify factors associated with in-hospital mortality.

Methods: Retrospective cohort study of pediatric major trauma patients (age <18 years) injured in Nova Scotia over a 17-year period (April 2001-March 2018). Data were collected from the Nova Scotia Trauma Registry. Characteristics were compared between patient subgroups using *t*-tests, chi-square analyses and Fisher's exact test. Temporal trends were evaluated using the Mann-Kendall test. Incidence and mortality rates were mapped using ArcGIS Pro. A multivariate logistic regression model was created to assess for factors associated with in-hospital mortality.

Results: A total of 1258 injuries were observed over the 17-year study period. The incidence of pediatric major trauma was 41.7 per 100,000 person-years. Most patients were male (819/1258; 65.1 %) and resided in urban areas (764/1258; 60.7 %). Blunt trauma accounted for 86.2 % (1084/1258) of injuries, and motor vehicle collisions were the most common cause (448/1258; 35.6 %). Incidence and mortality rates were highest in the 15–17 year age group, with a trend towards increasing incidence among females ($p = 0.011$). Mortality was 17.2 % (217/1258) of patients; 10.9 % (137/1258) died pre-hospital. No trends were detected in mortality rates. The regression model showed increased odds of in-hospital mortality for every point increase in the ISS (OR 1.05; 95 % CI 1.02 to 1.09) and for every unit decrease in scene GCS (OR 0.63; 95 % CI 0.56–0.71). Rural patients were 2 times more likely to die in-hospital versus urban patients (OR 2.40; 95 % CI 1.01–5.69), and patients injured at home were 6 times more likely to die compared to those injured in other locations (OR 6.19; 95 % CI 1.01–38.11).

Conclusion: Pediatric trauma remains a major public health issue in Canada and beyond. Greater efforts are required to expand our understanding of trauma epidemiology and develop targeted injury prevention strategies, especially for rural inhabitants.

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Introduction

Globally, injuries remain a significant public health concern, particularly for the pediatric population. Canada is no exception with injury being the leading cause of preventable death among children [1]. The economic burden of pediatric injury in Canada is estimated to cost over $5.1 billion annually [2]. Injury risk is multifactorial and population-specific [3]. Several studies suggest that the risk of injury is higher in children who are male [4], live in more rural areas [5], engage in substance use [6], and who do not have supportive home and school environments [7]. Socioeconomically disadvantaged children face higher rates of injury related to motor vehicles, firearms, and violence, and experience higher rates of readmission, subsequent repeat traumatic injury, and post-traumatic stress disorder [8–9]. Road traffic injuries are the most common mechanism resulting in death during childhood [10–13]. Pediatric trauma mortality is associated with injury type [14], greater injury severity [15], and lower socioeconomic status [9].

Few Canadian studies have investigated the epidemiology of pediatric major trauma at the population level. Understanding epidemiological features of pediatric trauma is essential for the development of injury prevention policies. In Nova Scotia, injury is the leading cause of death and hospitalization among children and youth with an estimated annual cost of $518 million [2]. However, our understanding of pediatric trauma in the province remains limited. Previous studies report longer hospital length of stay (LOS) for trauma patients outside of 60 min driving time to the pediatric trauma centre (PTC) [16] and have largely focused on pediatric trauma related to sport and recreational activities [17–20]. More population-based data and analyses are required to support efforts that provide targeted education to both care providers and the community to prevent or mitigate future traumas. The objective of this study was to describe the epidemiology of pediatric major trauma resulting from all causes (both intentional and unintentional) in Nova Scotia and to identify factors associated with in-hospital mortality in this population.

Methods

Study setting, design and population

The province of Nova Scotia had 969,383 inhabitants in 2021, with roughly half the population residing in the centrally located Halifax Regional Municipality (HRM) and the other half living in rural and remote areas. Nova Scotia has a provincial trauma system where all pediatric major trauma patients are referred to a single level 1 PTC located in Halifax. Prehospital transport of trauma patients may involve one or more modes of transport including ground ambulance, helicopter, and fixed-wing aircraft.

We performed a retrospective cohort study of all pediatric major trauma patients (age <18 years) injured in Nova Scotia between April 1, 2001, and March 31, 2018. We included all major trauma patients regardless of the intent or cause of injury. Data were collected from the Nova Scotia Trauma Registry (NSTR), a comprehensive population-based trauma registry under the NS Department of Health and Wellness. The NSTR captures data on all major trauma patients across Nova Scotia from all eight regional hospitals and both level 1 trauma centres, as well as data from the NS Medical Examiner Service. We included all major trauma patients regardless of the intent or cause of injury. Prehospital deaths were included in the analysis. Patients injured outside the province but subsequently transferred to the PTC or another facility in Nova Scotia for definitive management were excluded. Ethics approval for this study was obtained from our institutional REB (File #: 33,071). This study was performed in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (SDC Table 1).

Table 1
Comparison of patient characteristics between survivors and non-survivors.

Characteristic	Overall (*n*= 1258)	Survivors (*n*= 1041)	Non-Survivors (*n*= 217)	p-value
Age, n (%)				0.16
<1 year	73 (5.8)	64 (6.1)	9 (4.1)	
1–4 years	161 (12.8)	135 (13.0)	26 (12.0)	
5–9 years	142 (11.3)	122 (11.7)	20 (9.2)	
10–14 years	298 (23.7)	253 (24.3)	45 (20.7)	
15–17 years	584 (46.4)	467 (44.9)	117 (53.9)	
Age, mean ± SD	11.6 ± 5.7	11.4 ± 5.7	12.3 ± 5.6	0.027
Male sex, n (%)	819 (65.1)	683 (65.6)	136 (62.7)	0.41
Residence				<0.001
Urban	764 (60.7)	668 (64.2)	96 (44.2)	
Rural	446 (35.5)	359 (34.5)	87 (40.1)	
Missing	48 (3.8)	14 (1.3)	34 (15.7)	
Season, n (%)				0.23
Winter (Dec 1 – Feb 28)	234 (18.6)	184 (17.7)	50 (23.0)	
Spring (Mar 1 – May 31)	264 (21.0)	224 (21.5)	40 (18.4)	
Summer (Jun 1 – Aug 31)	422 (33.5)	345 (33.1)	77 (35.5)	
Fall (Sep 1 – Nov 30)	334 (26.6)	285 (27.4)	49 (22.6)	
Missing	$n < 5$	$n < 5$	$n < 5$	
Place of injury, n (%)				<0.001
Street/highway	655 (52.1)	547 (52.5)	108 (49.8)	
Home	260 (20.7)	180 (17.3)	80 (36.9)	
Sport/athletic area	66 (5.2)	66 (6.3)	0 (0)	
School/other institution/ public area	27 (2.1)	$n > 5$	$n < 5$	
Trade/service area	14 (1.1)	$n > 5$	$n < 5$	
Farm	12 (1.0)	$n > 5$	$n < 5$	
Other or unspecified	224 (17.8)	199 (19.1)	25 (11.5)	
Injury type, n (%)				<0.001
Blunt	1084 (86.2)	949 (91.2)	135 (62.2)	
Penetrating	83 (6.6)	68 (6.5)	15 (6.9)	
Drowning/asphyxia	47 (3.7)	$n < 5$	$n > 5$	
Burn	43 (3.4)	22 (2.1)	21 (9.7)	
Unknown	$n < 5$	0 (0)	$n < 5$	
Intentional injury, n (%)	53 (4.2)	9 (0.9)	44 (20.3)	<0.001
ISS, mean ± SD	18.9 ± 14.9	15.9 ± 10.7	34.0 ± 22.4	<0.001
GCS at scene, n (%)				<0.001
3–8 (severe TBI)	141 (11.2)	71 (6.8)	70 (32.3)	
9–12 (moderate TBI)	68 (5.4)	68 (6.5)	0 (0.0)	
13–15 (mild TBI)	627 (49.8)	622 (59.8)	5 (2.3)	
Missing	422 (33.5)	280 (26.9)	142 (65.4)	
GCS at scene, mean ± SD	12.6 ± 4.0	13.5 ± 3.0	4.2 ± 3.0	<0.001
GCS on ED arrival, mean ± SD	14.0 ± 2.8	14.3 ± 2.1	3.0 ± 0.0	<0.001
TTA, n (%)	663 (52.7)	632 (60.7)	31 (14.3)	<0.001

ISS, Injury Severity Score; GCS, Glasgow Coma Scale; TBI, traumatic brain injury; ED, emergency department; SD, standard deviation; TTA, trauma team activation.

Major trauma defined

The criteria for inclusion in the NSTR are an Injury Severity Score (ISS) >12 and an appropriate International Classification of Disease (ICD) External Cause of Injury Code (SDC Table 2). Penetrating injuries with an ISS ≥9 are included, as well as any trauma team activations (TTAs) regardless of ISS. In addition, traumas with an appropriate injury mechanism resulting in death at the scene, in the emergency department (ED), or within 24 h of hospital admission are included. We defined injuries caused by motor vehicle collisions (MVCs) as incidents involving passenger vehicles, buses or trucks and included non-collision motor vehicle incidents. Incidents involving motorcycles were categorized separately from MVC, while incidents where a vehicle hit a cyclist or pedestrian were categorised as being cyclist or pedestrian traumas, respectively.

Data collection

Data collected from the NSTR included age, sex, rural versus urban residence (postal codes with a "0″ in the second character were classified as "rural"), injury date, location of injury (i.e., municipality), ICD place of injury, injury type, intent of injury, protective devices, ICD-10-CA cause of injury, ISS, Glasgow Coma Scale (GCS), (scene, ED arrival), TTA, LOS (in-hospital, intensive care unit [ICU], special care unit [SCU]), mechanical ventilation requirement, and mortality.

Table 2
Primary cause of injury and patient outcomes by age group.

Variable	Age group <1 yr (*n* = 73)	1–4 yrs (*n* = 161)	5–9 yrs (*n* = 142)	10–14 yrs (*n* = 298)	15–17 yrs (*n* = 584)	All ages (*n* = 1258)
Cause of injury, n (%)						
MVC	*n* < 5	36 (22.4)	46 (32.4)	110 (36.9)	342 (58.6)	537 (42.7)
Fall	31 (42.5)	57 (35.4)	24 (16.9)	26 (8.7)	30 (5.1)	168 (13.4)
ATV/ORV/ Snowmobile	0 (0.0)	0 (0.0)	9 (6.3)	49 (16.4)	65 (11.1)	123 (9.8)
Pedestrian	0 (0.0)	17 (10.6)	21 (14.8)	50 (16.8)	35 (6.0)	123 (9.8)
Cyclist	0 (0.0)	*n* < 5	*n* > 5	35 (11.7)	23 (3.9)	73 (5.8)
Assault	*n* < 5	*n* < 5	*n* < 5	9 (3.0)	43 (7.4)	57 (4.5)
Self-harm	0 (0.0)	0 (0.0)	0 (0.0)	12 (4.0)	37 (6.3)	49 (3.9)
Motorcycle	0 (0.0)	0 (0.0)	*n* < 5	18 (6.0)	26 (4.5)	46 (3.7)
Fire/ explosion/ burn	*n* < 5	20 (12.4)	10 (7.0)	*n* > 5	5 (0.9)	41 (3.3)
Other	37 (50.7)	27 (16.8)	26 (18.3)	36 (12.1)	50 (8.6)	176 (14.0)
Outcomes						
Hospital admission, n (%)	64 (87.7)	127 (78.9)	115 (81.0)	233 (78.2)	435 (74.5)	974 (77.4)
SCU LOS, mean±SD	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	2.9 ± 2.3	2.9 ± 2.3
ICU LOS, mean±SD	4.4 ± 3.9	4.4 ± 6.1	3.8 ± 5.5	3.8 ± 6.5	6.0 ± 6.9	2.9 ± 2.3
Hospital LOS, mean ±SD	7.6 ± 9.1	7.6 ± 12.8	7.6 ± 20.1	9.8 ± 27.1	10.2 ± 14.6	9.3 ± 18.6
Ventilator days, mean ±SD	4.1 ± 3.9	4.5 ± 6.1	3.8 ± 5.5	3.8 ± 6.5	6.0 ± 6.9	4.9 ± 5.8
Mortality, n (%)	9 (12.3)	26 (16.1)	20 (14.1)	45 (15.1)	117 (20.0)	217 (17.2)

MVC, motor vehicle collision; ATV, all-terrain vehicle; ORV, off-road vehicle; SCU, Special care unit (includes ICU, IMCU and step-down unit); LOS, length of stay; ICU, intensive care unit; SD, standard deviation.

Outcomes

The primary outcome of interest was the incidence of pediatric major trauma in Nova Scotia. Secondary outcomes measures included in-hospital mortality, LOS (in-hospital, ICU, SCU), and requirement for mechanical ventilation.

Statistical analysis

Descriptive statistics were used to characterize the study population including means, standard deviations, and proportions. Injury rates were calculated based on 100,000 population (all ages) using population estimates from Statistics Canada. Injury rates are reported for full calendar years (Jan 2002-Jan 2018). Age- and sex-specific rates were calculated using population data from Statistics Canada. To compare patient characteristics between subgroups, we used *t*-tests, chi square analysis, and Fisher's exact test, as appropriate. Trend analysis was performed using the Mann-Kendall test. A multivariate logistic regression model was created to assess for factors associated with in-hospital mortality while controlling for age, sex, ISS, scene GCS, rural residence, injury type (blunt, penetrating, burn/drowning/asphyxia), and place of injury (home, street/highway, other). The Nagelkerke r-squared value was used to evaluate model fit. Choropleth maps were generated using ArcGIS Pro-version 2.9.5 (ESRI, Redlands CA) to visually convey injury and mortality rates by county. Data analysis was performed using SPSS software (version 28; IBM, SPSS Statistics Premium). A p-value of <0.05 was considered statistically significant. To maintain privacy, cell sizes less than 5 are reported as "$n < 5$″ and adjacent cells may be reported as "$n > 5$″ if they could be used to determine the suppressed values.

Results

Patient and injury characteristics

A total of 1258 patients over the 17-year study were included in the analysis. Table 1 compares characteristics of trauma survivors and non-survivors. The mean patient age was 11.6 ± 5.7 years and most were male (819/1258; 65.1 %). A larger proportion of traumas involved urban residents (764/1258; 60.7 %) and occurred most often during the summer (422/1258; 33.5 %) and fall (334/1258; 26.6 %). Most injuries were observed in the 15–17 year age group (584/1258; 46.4 %) followed by the 10–14 year age group (298/1258; 23.7 %). Blunt trauma accounted for 86.2 % (1084/1258) of injuries followed by penetrating trauma (83/1258; 6.6 %). Severe traumatic brain injury (TBI) was observed in 11.2 % (141/1258) of the cohort, and half of these patients died from their injuries (70/141; 49.6 %). Compared to survivors, non-survivors had higher mean age (12.3 ± 5.6 yrs vs 11.4 ± 5.7 yrs; $p = 0.027$) and a larger proportion resided in rural areas of the province (40.1% vs 34.5 %; $p < 0.001$). Non-survivors had higher mean ISS scores than survivors (34.0 ± 22.4 vs 15.9 ± 10.7; $p < 0.001$) and were more likely to be injured intentionally (20.3% vs 0.9 %; $p < 0.001$). A larger proportion of survivors received care from the pediatric trauma team (60.7% vs 14.3 %; $p < 0.001$).

The incidence of pediatric major trauma over the study period was 41.7 per 100,000 person-years. Annual incidence rates ranged between 29.4 and 55.5 injuries per 100,000 population. Injury rates were higher in males (53.0 per 100,000 person-years) compared to females (29.9 per 100,000 person-years). In both males and females, incidence and mortality rates were highest in the 15–17 year age group (Fig. 1A and B). We observed a trend towards increasing incidence overall ($p = 0.011$) and for females specifically ($p < 0.001$), while injury rates for males

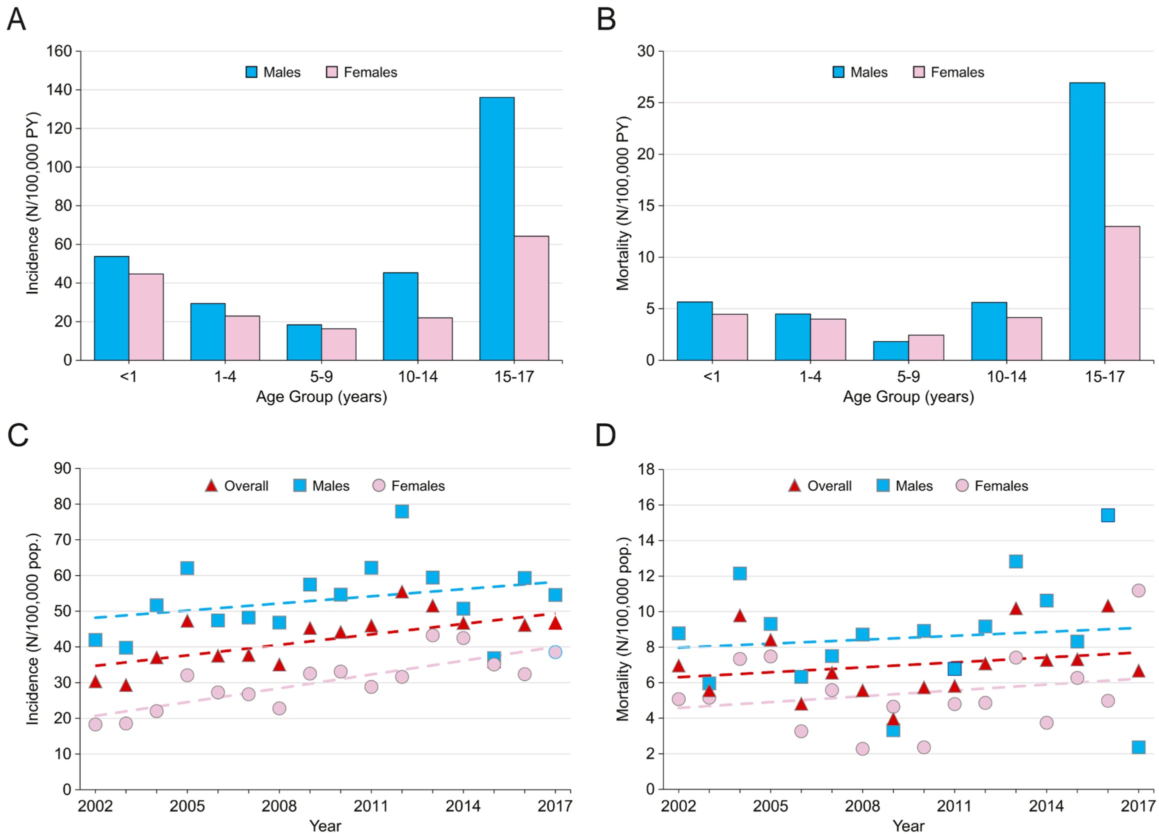

Fig. 1. Incidence, mortality rates, and trends in pediatric major trauma. (A) Incidence of injury by sex and age group; (B) Mortality rate by sex and age group; (C) Trends in injury incidence by sex; (D) Trends in trauma mortality by sex. LOS, length of stay; ICU, intensive care unit; PY, person-years.

remained stable ($p = 0.26$) (Fig. 1C). No trends were detected in mortality rates (Fig. 1D). The median hospital LOS decreased significantly over time ($p < 0.001$), as did the proportion of hospital admissions requiring ICU care ($p < 0.001$) (SDC Fig. 1). No significant trends were observed in the primary cause of injury during the study period. The geographic distribution of pediatric trauma incidence and mortality rates by county is shown in Fig. 2.

Injury causes and outcomes

Table 2 shows a breakdown of primary injury cause and trauma outcomes by age group. Most injuries were caused by MVCs (537/1258; 42.7 %), followed by falls (168/1258; 13.4 %), pedestrian-related trauma (123/1258; 9.8 %) and use of motorized recreational vehicles including all-terrain vehicles (ATVs), off-road vehicles (ORVs) and snowmobiles (123/1258; 9.8 %).

The largest proportion of MVCs were observed within the HRM (181/537; 33.7 %). Roughly a quarter of all injuries were related to sport and recreational activities (329/1258; 26.2 %), while firearm-related trauma accounted for a small percentage of cases (18/1258; 1.4 %). Additional information on injuries related to motorized vehicles and sport/recreational activities are shown in SDC Table 3 and SDC Table 4, respectively. In 77.4 % (974/1258) of all cases, the patient was admitted to hospital. Mean hospital LOS, ICU LOS, SCU LOS, and ventilator days were all highest in the 15–17 year age group. Overall, mortality was observed in 17.2 % (217/1258) of the sample, with 10.9 % (137/1258) of patients dying in the prehospital setting. The overall age-specific mortality rate was 7.0 deaths per 100,000 person-years. Age-specific mortality rates were highest among 15–17 year olds (20.1 per 100,000 person-years) and lowest in 5–9 year olds (2.1 per 100,000 person-years).

Factors associated with in-hospital mortality

Regression analysis was used to assess for factors associated with in-hospital mortality after controlling for age, sex, ISS, scene GCS, rural residence, injury type and location (Table 3). Every point increase in the ISS was associated with increased odds of in-hospital mortality (OR 1.05; 95 % CI 1.02 to 1.09). Every unit decrease in the scene GCS score was associated with an increased odds of in-hospital mortality (OR 0.63; 95 % CI 0.56–0.71). Patients residing in rural areas were 2 times more likely than urban patients to die in-hospital (OR 2.40; 95 % CI 1.01–5.69). Patients injured at home were 6 times more likely to die in-hospital compared to those injured in other locations (OR 6.19; 95 % CI 1.01–38.11). The Nagelkerke r-squared value was 0.66, indicating no significant issue with model fit.

Discussion

Over the 17-year study period, a total of 1258 pediatric major traumas were observed in Nova Scotia with an incidence of 41.7 per 100,000 person-years. Males aged 15–17 years had the highest incidence rates. There was a trend towards increasing injury incidence in females, but not in males. MVCs and falls were the leading causes of injury, with most injuries observed in urban residents. Mortality occurred in 17.2 % of cases, with an overall age-specific mortality rate of 7.0 per 100,000 person-years. Males aged 15–17 years were found to have the highest mortality rate. After controlling for potential confounders, mortality was associated with increasing ISS, decreasing scene GCS and rural residence. These findings contribute to our broader understanding of pediatric major trauma in Nova Scotia and can be used to inform future research at the local and national levels.

Previous studies of pediatric trauma epidemiology in Nova Scotia have focused specifically on injuries related to sport and recreational

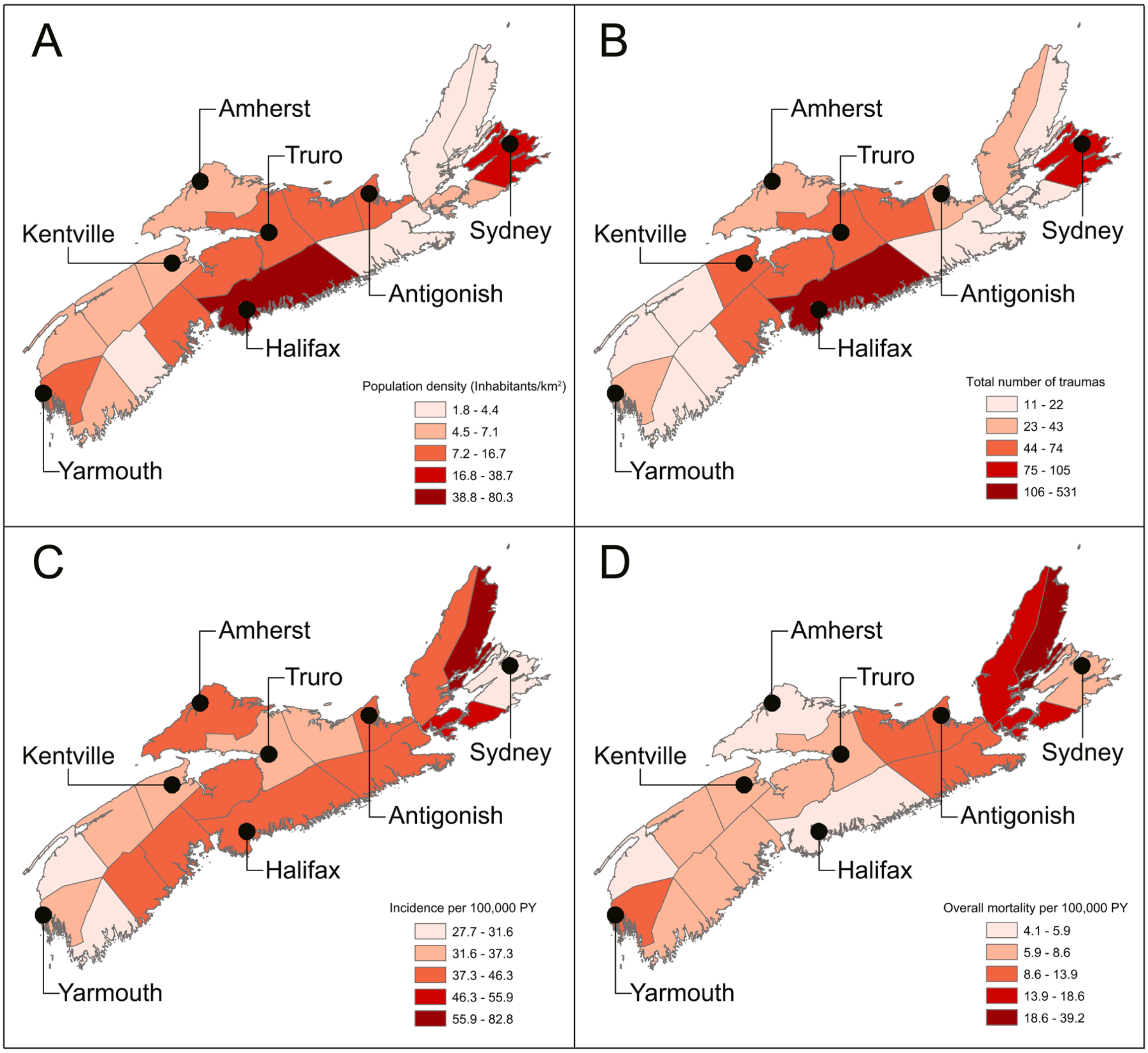

Fig. 2. Geospatial mapping of major trauma incidence and mortality rates. (A) Population density by county; (B) Frequency of major trauma by county; (C) Incidence rates by county; (D) Rates of overall mortality by county. PY, person-years.

Table 3
Factors associated with in-hospital mortality in pediatric trauma patients.

Variable	Odds Ratio	95 % CI	p-value
Age	1.03	0.93–1.14	0.56
Male sex	0.84	0.36–1.99	0.69
Rural residence	2.40	1.01–5.69	0.048
ISS	1.05	1.02–1.09	0.002
GCS at the scene	0.63	0.56–0.71	<0.001
Injury type (REF: Blunt)			
Penetrating	0.97	0.04–26.72	0.99
Burn/drowning/asphyxia	4.28	0.71–25.85	0.11
Place of injury (REF: Other)			
Home	6.19	1.01–38.11	0.049
Street/highway	1.08	0.27–4.33	0.92

ISS, Injury Severity Score; GCS, Glasgow Coma Scale; CI, confidence interval.

activities [17–20] and firearm-related injury [21]. Our broader epidemiologic study demonstrates that 26.2 % of pediatric traumas were sport and recreation-related and 1.4 % were related to firearms; MVCs were the leading cause of pediatric trauma in Nova Scotia, similar to findings from studies conducted across Canada [12,22-25], the United States [26], and Japan [27]. Although the majority of MVCs occurred within HRM, we observed the highest incidence rates in remote regions of the province. Others have reported that children residing in rural areas are at higher risk of overall injury, MVC injury, and suicide [28–30]. Pedestrian MVCs in the HRM have been associated with a pattern of geographic, environmental, and socioeconomic factors. For example, there is a higher incidence of injury in children from low to middle socioeconomic groups whose housing is separated from a roadside attraction by several lanes of traffic and blind hills/bends [31]. Notably, we observed a steady decline in the LOS of pediatric trauma patients and in the proportion of cases requiring intensive care; further research is required to understand the factors contributing to these promising trends.

Data from the Canadian Institutes for Health Information (CIHI) Discharge Abstract Database (DAD) between 2006 and 2012 shows the average annual mortality rate from all unintentional injuries was 7.97 per 100,000 in all Canadian children aged 0–19 years, and an average annual mortality rate of 9.81 per 100,000 among children in Nova Scotia [32]. This reported mortality rate from CIHI data up to 2012 is higher than the rate of 7.0 deaths per 100,000 we observed between 2002 and 2017, even though our study included intentional injuries which are more likely to result in death [33]. This difference may be partly explained by the exclusion of 18- and 19-year-olds from our study, as these individuals are more likely to have died in an MVC. Regarding in-hospital mortality, our findings align with previous studies demonstrating an association between greater injury severity and poor patient outcomes [14,15,34]. We also observed an association between rural residence and in-hospital mortality which has been shown in previous studies [35–36]. In a previous study investigating prehospital mortality in the pediatric trauma population of Nova Scotia, the likelihood of mortality (at the scene or during transport) was associated with increasing ISS, increasing age, and intentional injury [37]. In the present study, increasing ISS was similarly associated with in-hospital mortality; however, we observed no association with patient age, and the effect of intentional injury was difficult to model with confidence due to low numbers. While we did not evaluate comorbidities in this study, other researchers have reported an association between adolescent injury and mental health [38]. In a study of high school students in Nova Scotia, elevated depressive symptoms were associated with transport-related injury in males, with unintentional injury in females, and with violence-related injury in both males and females [39].

This population-based analysis of trauma epidemiology adds to the national discussion on pediatric trauma in Canada and highlights the need to evaluate and provide region-specific injury prevention initiatives. Compared to adult trauma patients, children have unique anatomy and physiology which must be taken into consideration when managing their care. More than 1 in 10 patients in Nova Scotia sustained a TBI which is the leading cause of death among pediatric trauma patients [40]. Injury prevention efforts to reduce the risk of TBI have been introduced in the province, and while there is evidence that a multifaceted approach including education, legislation and enforcement can achieve helmet compliance among skiers and snowboarders [41], legislation and social marketing interventions designed to reduce ATV-related injuries appear to have had limited effectiveness thus far [18].

This study is subject to the known limitations of retrospective research performed on an existing dataset and cannot be used to imply causality. Although data were obtained from a robust population-based trauma registry which also captures data from the NS Medical Examiner Service and has quality-control procedures for accurate data entry, some variables were missing values while other important considerations for pediatric trauma patients (e.g., socioeconomic status, level of supervision, ethnicity) are not collected in the NSTR. The results of this study are based on the province of Nova Scotia with its integrated (single provider) trauma system, unique geography and population distribution that includes a capital region of ~ 500,000 people and a significant number of rural and remote regions with extremely low population densities. In addition, the NSTR employs a very specific definition of major trauma. Thus, our findings may not be completely generalizable to other provinces or jurisdictions.

Conclusion

Further epidemiologic studies, using comprehensive database sets such as that found within the NSTR, are required to determine the role of important factors on pediatric trauma incidence and mortality, including time to tertiary care, substance misuse, mental health conditions, and broader social determinants of health. Pediatric trauma remains a major public health issue in Canada. Greater efforts are required to expand our understanding of trauma epidemiology across the nation and to develop targeted injury prevention strategies, especially for children residing in rural areas.

Presentations at conferences

Presented as a podium presentation at the 2023 Trauma Association of Canada Annual Scientific Meeting and Congress, April 20 - 21, in Edmonton, Alberta.

Consent for publication

Waiver of consent was granted by the Nova Scotia Health Research Ethics Board.

CRediT authorship contribution statement

Andrea Sadoway: Conceptualization, Methodology, Writing – original draft. **Renee Kinden:** Conceptualization, Investigation, Writing – review & editing. **Mete Erdogan:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Software, Supervision, Validation, Visualization, Writing – review & editing. **Nelofar Kureshi:** Formal analysis, Investigation, Methodology, Software, Writing – review & editing. **Michelle Johnson:** Conceptualization, Investigation, Writing – review & editing. **Robert S. Green:** . **Jason G. Emsley:** Conceptualization, Investigation, Methodology, Project administration, Supervision, Writing – review & editing.

Declaration of competing interest

No conflicts of interest are declared. The authors received no financial support for the research, authorship, or publication of this article.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.injury.2024.111484.

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