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Research Article

A Retrospective Analysis of the Incidence of Trauma-Related Injuries in the Premier Public Hospital in Georgetown, Guyana

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Abstract

Trauma-related injuries (TRIs) have become a significant global health concern, with road accidents ranking among the top causes of mortality, particularly in individuals aged 5-29 years. The World Health Organization highlights that at least one in five leading causes of TRIs are linked to road accidents, which claim more lives than many other health conditions. This issue affects both high- and low-income countries, contributing to a growing burden on health resources. In Guyana, the situation mirrors global trends, with a notable increase in TRIs, primarily from road accidents. This prompted an investigation into the prevalence of trauma-related cases at the Georgetown Public Hospital Corporation (GPHC), the country's main referral hospital. A retrospective analysis was conducted on cross-sectional data from the GPHC trauma registry, focusing on patients treated at the Accident and Emergency Department in the second half of 2022. The study aimed to identify prevalent types of TRIs and their distribution across patient demographics. The study included 713 trauma cases, with an average incidence rate of 3.4%. The leading cause of injury was road accidents, accounting for 28.1% of cases, followed by interpersonal/domestic violence (21.7%) and falls (21%). Male patients made up the majority of admissions, with 36% of cases being treated in male surgical wards. Soft tissue injuries were the most common trauma type, slightly more prevalent among females (52.2%) than males (42.1%). More severe injuries, such as stabs, punctures, and gunshot wounds, were significantly higher among males (18.2%) compared to females (4.5%). The analysis identified adults aged 25-44, with a mean age of 33, as the most frequently injured group. Road accidents were the predominant cause of injury for both genders, while interpersonal/domestic violence was more common among males, and falls were more frequent among females. The study highlights the urgent need for further research, particularly multi-year analyses, to detect long-term patterns in trauma cases. Such insights are crucial for improving preparedness and tailoring interventions to meet evolving needs. The findings offer valuable information for developing targeted educational initiatives and strategies to reduce injury-related mortality and morbidity in Guyana.

Keywords: Trauma-Related Injuries; Road Accidents; Motor Vehicular Accidents; Injury Prevalence; Emergency Department Injuries; Trauma Registry

Abbreviations

TRI: Trauma-Related Injuries; NCD: Non-Communicable Diseases; WHO: World Health Organization; HIV: Human Immunodeficiency Virus; AIDS: Acquired Immunodeficiency Syndrome; GPHC: Georgetown Public Hospital Corporation; AED: Accident and Emergency Department; MOH-IRB: Ethical Review Committee of the Ministry of Health; MVA: Motor Vehicular Accidents

Introduction

Traumatic-related injuries (TRI) are a significant, pervasive health issue globally, contributing to high rates of death, disability, and heightened economic burden, particularly in low- and middle-income countries [1]. Bozorgi., *et al.* [2] also reported that TRI covers over eight percent or 4.4 million deaths globally annually, with an incidence rate of ten percent. Of these 4.4 million deaths, 3.26

million are accident-related, and 1.25 million are due to violent accounts [3]. Trauma-related injuries (TRIs) have become a significant global health concern, with road accidents ranking among the top causes of mortality, particularly in individuals aged 5-29 years [4]. Road injuries are a significant cause of TRIs, surpassing other causes of mortality in younger age groups, such as HIV- AIDS and tuberculosis. Rosenkrantz., *et al*. [5] noted that for each death resulting from TRI, approximately fifty individuals are left hospitalized or disabled, significantly affecting productivity, family dynamics, and overall well-being. Research further links TRI to a higher risk of NCD, as the body's stress response to such injuries can lead to inflammation and organ damage, contributing to chronic conditions. This connection between TRI and Non-Communicable Diseases (NCD) is recognized as a significant factor in global mortality and morbidity. Despite global efforts to improve road safety, the rates of injury and death remain high, with TRI contributing to long-term disability and increasing the risk of developing chronic diseases [6].

Trauma-related injuries, especially motor vehicular injuries, are a significant but under-addressed global public health concern that demands urgent action [4]. Studies have shown an alarming prevalence of these incidents, with motor vehicle crashes accounting for a significant portion of trauma-related emergency department visits. The pattern of injury varies, ranging from lacerations and fractures to more complex conditions requiring prompt diagnosis and treatment. Understanding the trends and patterns of these trauma-related injuries, including the rate of motor vehicular accidents, is crucial for developing effective prevention and intervention strategies to address this growing public health concern.

In Guyana, the growing burden of TRI and the harmful effects of NCD reflect global trends, with rising risks of death and disability. Reports from local outlets, such as the Guyana Times [7], highlight a troubling rise in health risks associated with road accidents, alarming both the public and government officials. Although there was a significant 29% decrease in mortality rates in 2021, the local authorities remain very concerned about the serious consequences of fatal road accidents in the country, urging fellow leaders to advocate for more robust legislative measures and cultural changes to mitigate this issue. Additionally, it has been proposed a comprehensive national campaign to address the "alarming killing rate," as Guyana maintains one of the highest per capita rates of road accidents. The local authority emphasized that simply enhancing laws is insufficient; there is also a critical need for education and public awareness to effectively address this challenge [7].

Motor vehicle accidents have emerged as a major public health crisis in Guyana. Despite various improvements in road safety, road accidents have consistently remained one of the leading causes of death over the past decade. The Guyana Police Force reported an annual average of 120 to 130 road fatalities between 2010 and 2020, with noticeable increases during festive periods. In 2023, the country recorded over 100 road fatalities, highlighting a troubling trend [8].

This study aims to address the scarcity of local research on TRI by analyzing data from the Georgetown Public Hospital's trauma registry. The purpose is to identify epidemiological patterns, referral trends, and outcomes of trauma cases to better inform healthcare interventions and policies. By analyzing past data, the study seeks to improve trauma care planning, promote early intervention strategies, and foster collaboration among healthcare providers, government agencies, and the community. The findings are expected to enhance knowledge-sharing and contribute to more effective prevention and management of traumatic injuries in Guyana.

Materials and Methods

- **Study Design:** The researchers performed a retrospective analysis of cross-sectional data from the trauma registry to identify common trauma-related injuries among patients at the Accident and Emergency Department (AED) of Georgetown Public Hospital Corporation (GPHC) in the second half of 2022. This method provides insights into injury mechanisms, patient demographics, treatment outcomes, and healthcare utilization. It aims to enhance understanding of trauma care practices, support better clinical decision-making, and guide future research or policy development using already available data.
- **Study setting and participants:** This study focuses on individuals diagnosed with TRI as recorded in the electronic registry of the AED at GPHC during the last six months of 2022. Patients included were those diagnosed with physical trauma, as well as those pronounced dead on-arrival or after resuscitation attempts. Calculating a hospital-based incidence involved referencing the total number of people attending the AED during the study period against those with confirmed TRI diagnoses. Patients with incomplete medical records were excluded from the analysis. All data collection occurred within the premises, pre-scheduled at the department's convenience.
- **Procedures for Recruitment and Consent:** Before conducting the study, the research team obtained the necessary per-

mission and ethical clearance from both the Ethical Review Committee of the Ministry of Health (MOH-IRB) and the GPHC Research Board. Following this, the GPHC Research Board formally informed all relevant departments, including the head of the AED unit, trauma registrar, trauma registry clerks, and records administrator. This collaboration was essential for proceeding with the study, seeking any necessary clarifications, and identifying eligible patients from the electronic trauma registry files in accordance with the predetermined eligibility criteria.

The investigators, with the assistance of trauma registry clerks, conducted a retrospective review of the electronic trauma registry record for all patients with trauma-related injuries, adhering to the study's inclusion criteria within the study period. The information extracted from the trauma registry encompassed demographic details, medical history, triage score (indicating the urgency of care), geographical location, admission month-time, and referral to the specialty clinic. This data was analyzed and reported in an anonymized, aggregated format. The researchers, aided by a co-investigator from the University of Guyana, thoroughly reviewed and analyzed the data using a secured encrypted electronic database or spreadsheet.

The information gathered included patient demographic details, verified with the trauma registry, and detailed observations of the injury's history, mechanism, location, and diagnosis. Additionally, the patient outcome and disposition were documented, including whether they were admitted to the AED with trauma-related injuries as per the study criteria. Outcomes such as trauma-related death upon arrival at the AED unit of GPHC, deaths following attempted resuscitation, referrals to other specialty wards or clinics, and discharges to home were included in the data analysis. The injury severity was assessed using the Glasgow Coma Scale and Kampala Trauma Scoring. Patient outcomes from the AED unit were categorized into groups: those admitted or referred to specialty wards, treated or discharged home, and fatalities.

Statistical analysis

Data analysis was conducted using SPSS version 21 software. The principal investigators coded the raw data into a dataset. Descriptive statistical methods, including frequency distributions, means, and standard deviations, were employed to ascertain the incidence of the studied phenomena. Additionally, cross-tabulation analysis and a chi-square test were used to identify associations between the variables under study. Any p-value less than 0.05 was considered significant, adhering to a 5% significant level.

Ethical consideration

The study received ethical approval from both the Guyana Ministry of Health Institutional Review Board and the Georgetown Public Hospital Research Committee. Researchers accessed TRI records at the time of submission without collecting new data or engaging with patients, thus negating the need for informed consent. The study posed minimal risk and did not impact patient rights, welfare, or care. Confidentiality was strictly maintained, with all records securely stored in an encrypted database and personal identifiers excluded from any publications. In accordance with ethical guidelines, documents will be retained for six years before being securely destroyed. The study is exempt from additional regulatory retention or inspection requirements.

Results

From July to December of 2022, the AED at GPHC attended a total of 25,925 individuals. Among the total, only 891 cases were identified as trauma-related and recorded in the trauma registry. From this subset, 713 cases of trauma-related injuries (TRIs) with sufficiently comprehensive records were included in the study, resulting in an average incidence rate of 3.4%.

Months	No. of Patients attended AED	No. of Trauma-related Cases	Incidence rate x 100	No. of TRI cases studied
July	4180	180	4.31	93
August	4302	311	7.23	287
September	3927	252	6.41	219
October	4353	42	0.96	36
November	4288	53	1.24	40
December	4875	53	1.09	38
Total	25 925	891	3.44	713

Table 1: Incidence Findings. Number of patients seen in GPHC-AED versus TRI (Trauma registry).

Throughout the study period, the months of July to September accounted for the highest proportion of patients, constituting 17.95% of the total cases, with August being particularly notable for trauma-related injuries. Conversely, the last quarter of the year witnessed a lower incidence, representing 2.43% of the total cases.

The incidence of trauma-related injuries (TRIs) reached its peak during the months of August (7.23%), September (6.41%), and July (4.31%). In contrast, the lowest incidence is between the months of October (0.96%), December (1.09%) and November (1.24%).

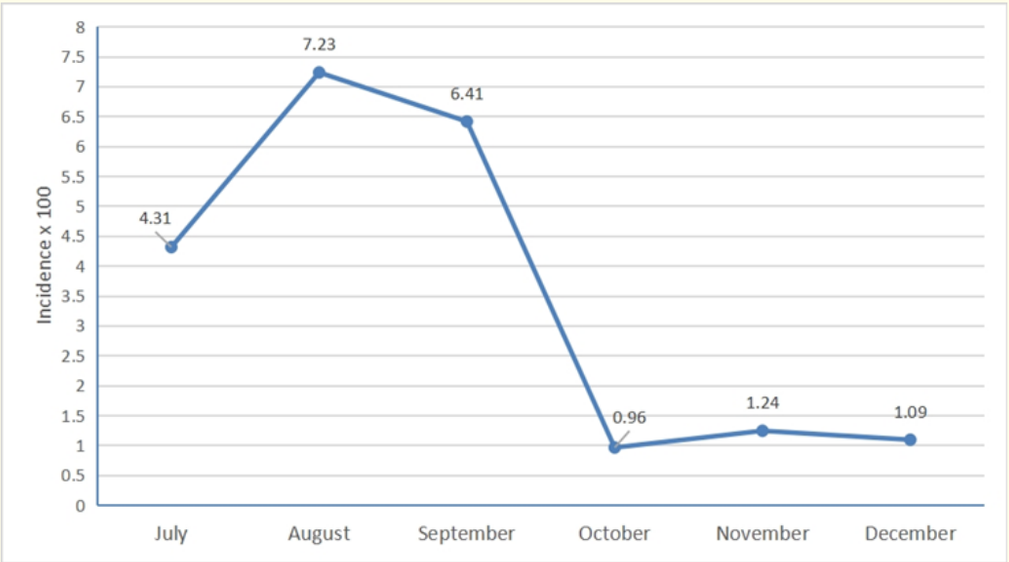

Figure 1: Incidence of Injuries by Month, July to December 2022.

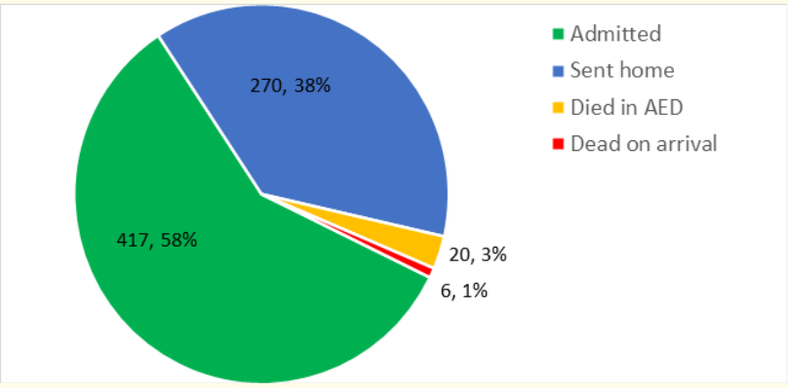

Figure 2: Admission/outcome of Trauma-related cases.

The study's findings on the final outcomes of trauma-related cases showed that 58.5% of individuals were admitted and later referred to different wards for further treatment and management. Additionally, 38% received treatment and were subsequently discharged, while 4% either died upon arrival or during medical intervention in the AED.

The study population with TRI predominantly comprises individuals aged 25-44, who comprise 35.6% of the total. This group is followed by those aged 19-24 and 45-64, (both at 18%), as well as individuals under one year (1.3%) and those aged 1-4 (4.3%). Overall, 99.4% of the study population are Guyanese, with ages ranging from one month to 91 years and a mean age of 33 (±19). Non-Guyanese participants account for only 0.6%. Among the Guyanese, Afro-Guyanese make up the largest ethnic group at 57.6%, followed by East Indian at 22% and mixed ethnicity at 13.9%. Indigenous Guyanese represent 5%, while Chinese-Guyanese are underrepresented at 0.3%. In terms of gender, males dominate at 78%, while females represent 22%. Most participants are single, 79.9%, followed by married individuals, 10.5%, and those in common-law relationships, 8.1%. Widow/widowers account for 1.0%, and 0.4% of the population is undocumented.

Table 2: Factors influencing admissions. Admission, location of injury, source of referral, and triage level.

Factors	No.	%
Time of Admission (Shift)		
8 AM - 4 PM	230	32.3
4 PM - 12 AM	180	25.2
12 AM - 8 AM	81	11.4
Not documented	222	31.1
Place where injury occurred		
Non-specific (unknown)	507	71.1
Road/street	204	28.6
Other (mining, sports injury)	2	0.3
Referred from		
Walked-in (self-referral)	635	89.1
Regional/Public Hospital	47	6.6
Health center	22	3.1
Private Hospital/Clinic	8	1.1
Prison	1	0.1
Triage		
Urgent	678	95.1
Immediate	29	4.1
Non-immediate	6	0.8

Most of the study population consists of self-referred or walk-ins (89.1%), while others were referred from regional public hospitals (6.6%), health centers (3.1%), private institutions (1.1%), or prisons (0.1%). Data also indicates that while 31.13% of admissions were unrecorded, the highest concentration occurring between 8 AM and 4 PM (32.3%), followed by the evening shift (25.2%) and the early morning shift being the least (11.4%). Additionally, TRI cases often occurred on the road or street (28.6%), while most were recorded as having non-specific locations (71.1%). Most TRI were classified as urgent (95.1%), reflecting the severity of the cases.

Table 3 shows that the lower extremities were the most frequently injured body part, comprising 27.5% of cases, followed by head/face injuries at 25.5% and upper extremities at 21.9%. Polytrauma occurred was observed in 10.5% of cases, back-trunk injuries in 9.5%, and neck-chest injuries for 4.6%. Motor vehicular accidents were the leading mechanism of injury at 28.1%, followed by interpersonal/domestic violence (21.7%) and falls (21.0%). Notably, one case was linked to a natural disaster, and 14.7% had an unknown cause. The Accident and Emergency Department at GPHC primarily encounters blunt trauma/soft tissue injuries (25.2%), fractures (23.1%), and lacerations (18.7%), while eye injuries (0.6%), amputated fingers, and cervical injuries (0.4%) are the least common.

Table 4 shows that most patients with hypertension had systolic blood pressure readings between 90-140 mmHg (56.9%), while diastolic blood pressure readings were between 60-80 mmHg (42.6%) and over 80 mmHg (41.7%). Nearly all individuals (98.7%) exhibited mild Glasgow Coma Scale (GCS) disruptions. Trauma severity scores assessed by the Kampala Trauma Scale revealed that 87.4% had mild scores, 11.5% had moderate scores, and severe trauma was rare (0.1%). Regarding patient disposition, 58.5% were admitted to various wards, with 65.9% referred to specialty clinics. Most admissions were to male surgical wards (36%), followed by female surgical wards (10.1%), pediatric wards (8.6%), critical care units (2.4%), and high resuscitation (0.3%). Among referrals, Orthopedics accounted for the largest proportion at 26.4%, followed by General Surgery at 25.5%. Neurology had a

Table 3: Body part injured and Mechanism of Injury.

Factors	No.	%
Primary Body Part Injured		
Head and Face	182	25.5
Neck	15	2.1
Chest	18	2.5
Back/Trunk	68	9.5
Upper extremities	156	21.9
Lower extremities	196	27.5
Poly-trauma	75	10.5
Other/Not documented	3	0.4
Mechanism of Injury		
Road accident/MVA	200	28.1
Interpersonal/Domestic violence	155	21.7
Falls	150	21.0
Blunt force (non-penetrating)	60	8.4
Gunshot	21	2.9
Fire/heat	11	1.5
Mechanical (penetrating)	2	0.3
Self-harm/Suicide	8	1.1
Natural disaster	1	0.1
Unknown	105	14.7

Table 4: Health Status and severity of injury upon admission (Clinical Parameters: Vital Signs, Glasgow Coma Scale, Kampala Trauma Score).

Vital/Clinical Signs	No.	%
Systolic Blood Pressure (mmHg) [SBP]		
< 90	6	0.8
90 - 140	406	56.9
> 140	231	32.4
Not documented/Children	70	9.8
Diastolic Blood Pressure (mmHg) [DBP]		
< 60	42	5.9
60 - 80	304	42.6
> 80	297	41.7
Not documented/Children	70	9.8
Respiratory Rate [RR]		
Low	14	2.0
Normal	647	90.7
Elevated	45	6.3
Not documented	7	1.0
Glasgow Coma Scale [GCS]		
Mild (13 - 15)	704	98.7
Moderate (9 - 12)	4	0.6
Severe (3 - 8)	1	0.1
Not documented	4	0.6
Kampala Trauma Scale [KTS]		
Mild (14 - 16)	623	87.4
Moderate (11 - 13)	82	11.5
Severe (5 - 10)	1	0.1
Not documented	7	1.0

referral rate of 5.3%, pediatrics at 4.9%, and internal medicine at 2.1%, while Ophthalmology-Optometry and other specialties were referred at 1.1% and 0.6%, respectively. There were no referrals to rehabilitation specialties.

In Table 5, the study population shows that extremity injuries were the most common among both males (47.7%) and females (55.4%), followed by head and face injuries. Motor vehicle accidents (MVA) impacted females (30.6%) more than males (27.3%) and soft tissue injuries were prevalent, affecting 52.2% of females and 42.1% of males. A significant association exists between gender, injured body part, and mechanism of injury, with p-values of 0.023 and 0.002, respectively. While extremities were the most injured site for both genders, females had a higher proportion. Males had more head and face injuries, while neck, chest, back, and trunk injuries were more frequent in males. Motor vehicular accidents were the leading cause of injury, with a slightly higher incidence in females. The rates of interpersonal and domestic violence were higher in males (23.7%) than females (14.6%). Additionally, gunshot injuries were observed only in males (4.1%), whereas falls were more common in females (26.1%) compared to males (19.6%). There was a strong association (p-value < 0.0001) between injury type and gender. Soft tissue injuries were slightly higher in females (52.2%) than males (42.1%), while fractures, the second most common injury type, were more prevalent in females (26.1% vs. 22.8% in males). Conversely, stabs, punctures, and gunshot wounds were significantly more frequent among males (18.2%) than females (4.5%).

Table 5: Injury Location, mechanism of injury and specific type (nature) of injury in relation to Gender.

Factors	Male		Female	
	No.	%	No.	%
Body Part (location) Injured [Chi-square p-value = 0.023]				
Head/Face	151	27.2	31	19.7
Neck/Chest	31	5.6	2	1.3
Back/Trunk	51	9.2	17	10.8
Extremities	265	47.7	87	55.4
Multiple Body Parts	57	10.3	18	11.5
Other/Not documented	1	0.0	2	1.3
Mechanism of Injury (Chi-square p-value = 0.002)				
Road accident/MVA	152	27.3	48	30.6
Interpersonal/Domestic violence	132	23.7	23	14.6
Falls	109	19.6	41	26.1
Blunt force (non-penetrating)	45	8.1	15	9.6
Gunshot/Mechanical penetrating	23	4.1	0	0.0
Fire/heat	5	0.9	6	3.8
Self-harm/Suicide	5	0.9	3	1.9
Other/Unknown	85	15.3	21	13.4
Specific type of Injury (Chi-square p value < 0.0001)				
Soft Tissue Injury [a]	234	42.1	82	52.2
Fracture	127	22.8	41	26.1
TBI (Includes /skull fracture)	40	7.2	11	7.0
Stab/Puncture/Gunshot Wounds [b]	101	18.2	7	4.5
Polytrauma	26	4.7	5	3.2
Burns	3	0.5	5	3.2
Other/Unspecified	25	4.5	6	3.8

a. Includes blunt trauma, lacerations, contusions, and abrasions. b. Includes deep lacerations.

Table 6 presented data on injury location, mechanism of injury, and the predominant nature (kind) of injury categorized by age groups. The associations were highly significant for injury location with a p-value of 0.001. Additionally, the p-value for the mechanism of injury and the specific type (kind) of injury is even lower, less than 0.0001, which suggests that the categories of injuries significantly differ across various age groups. The data also reveals that the location and type of injuries are consistent for all age groups, namely, extremities and soft tissue injuries. However, the mechanism of injury varies among age groups. For instance, falls are the most frequent mechanism of injury for age groups <19 years and over 45 years, while for ages 19-44 years, road accidents, specifically motor vehicular accidents, are the most common.

Table 6: Injury location, mechanism of injury and specific injury type by Age group.

Factors	< 19 years		19 - 44 years		45 years or more	
	No.	%	No.	%	No.	%
Primary Body Part Injured (Chi-square p-value = 0.001)						
Head/Face	52	36.1	92	24.0	38	20.4
Neck/Chest	3	2.1	24	6.3	6	3.2
Back/Trunk	9	6.2	46	12.0	13	7.0
Extremities	69	47.9	172	44.9	111	59.7
Multiple Body Parts	11	7.6	46	12.0	18	9.7
Other/Not documented	0	0.0	3	0.8	0	0.0
Mechanism of Injury (Chi-square p-value < 0.0001)						
Road accident/MVA	21	14.6	130	33.9	49	26.3
Interpersonal/Domestic violence	21	14.6	103	26.9	31	16.7
Falls	40	27.8	59	15.4	51	27.4
Blunt force (non-penetrating)	21	14.6	24	6.3	15	8.1
Gunshot/Mechanical penetrating	4	2.8	16	4.2	3	1.6
Fire/heat	5	3.5	3	0.8	3	1.6
Self-harm/Suicide	2	1.4	4	1.0	2	1.1
Other/Unknown	30	20.8	44	11.5	32	17.2
Specific type of Injury (Chi-square p value < 0.0001)						
Soft Tissue Injury [a]	78	54.2	155	40.5	83	44.6
Fracture	23	16.0	83	21.7	62	33.0
TBI (Includes /skull fracture)	16	11.1	25	6.5	10	5.4
Stab/Puncture/Gunshot Wounds [b]	11	7.6	84	21.9	13	7.0
Polytrauma	7	4.9	14	3.7	10	5.4
Burns	3	2.1	2	0.5	3	1.6
Other/Unspecified	6	4.2	20	5.2	5	2.7

[a] Includes blunt trauma, lacerations, contusions and abrasions. [b] Includes deep lacerations.

As shown in figure 3, hospital admission rates were marginally higher for female patients (61.1%) compared to male (57.7%) patients. Regarding discharge rates, males have a slightly higher rate (38.1%) of being sent home compared to females (36.9%). The mortality rate is higher among male (4.1%) than female (1.9%) patients.

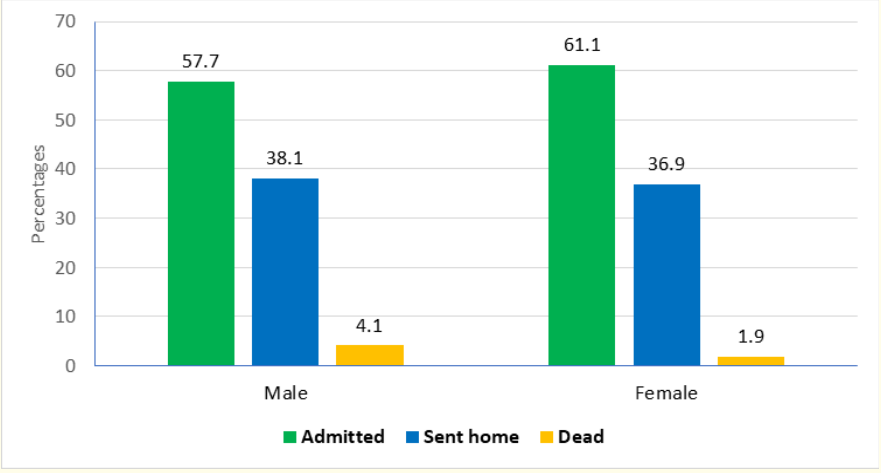

Figure 3: Patients' Outcome Related to Gender. (chi-square p-value = 0.377).

Figure 4 illustrates that the admission rate is highest in the youngest age group (< 19 years) at 68.1%, and this group experiences the lowest incidence of death at 1.4%. In the middle age group (19-45 years), there is a balanced distribution, with 54.8% admitted and 40.5% sent home and the highest incidence of death rate at 4.7%. In contrast, the oldest age group (45 years or more) exhibited diverse outcomes, with 58.6% admitted, 38.2% sent home, and a 3.2% mortality rate.

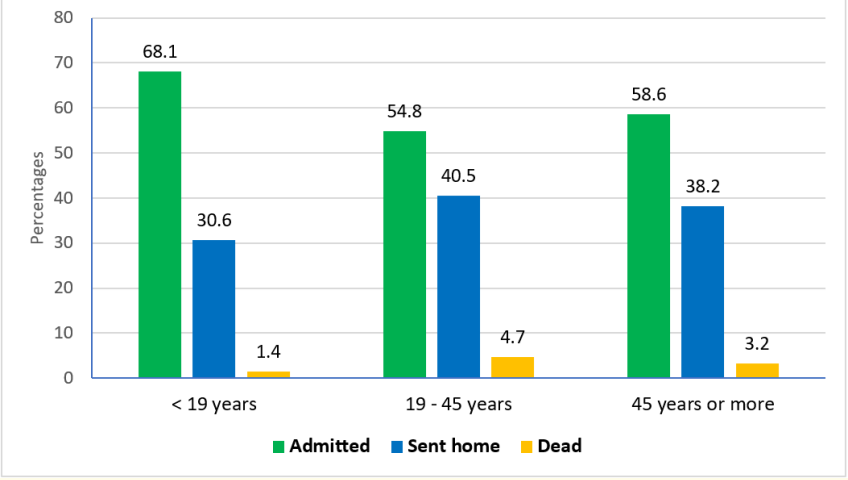

Figure 4: Patients' Outcome Related to Age Groups. (chi-square p-value = 0.058).

Table 7 discusses patient outcomes related to body part injuries, mechanisms of injury, and injury types, highlighting a strong statistical correlation between these factors and patient outcomes. Different injuries lead to varied outcomes; for instance, head and face injuries resulted in a 55.5% admission rate, 39% discharged home, and a 5.5% death rate, indicating their severity. Extremity injuries had a high admission rate of 59.1% but a low death rate of 0.9%. Polytrauma was linked to a higher death rate of 8%. Motor vehicle accidents had the highest mortality rate at 6.5%, with 53.5% of patients discharged. Other mechanisms such as fire/heat

(90.9%), falls (84%), gunshot wounds (73.9%), blunt force trauma (68.3%), and interpersonal/domestic violence (60.6%) also resulted in over 50% admissions, with the latter showing a mortality rate of 5.2% and 34.2% sent home. Self-harm, unknown cases, and road accidents were frequently associated with patients being discharged. Specific injuries leading to hospital admissions included burns (87.5%), traumatic brain injuries (TBI) with skull fractures (80.4%), fractures (73.8%), polytrauma (67.7%), unspecified injuries (64.5%), and stab/puncture/gunshot wounds (61.1%). Additionally, a significant number of patients with soft tissue injuries (52.2%), stab/puncture/gunshot wounds (34.3%), fractures (25.6%), and polytrauma (25.8%) were commonly discharged.

Table 7: Patient Outcome related to injured body part, mechanism of injury, and specific type (nature) of the injury.

Factors	Sent Home		Admitted		Dead	
	No.	%	No.	%	No.	%
Body Part Injured (Chi-square p-value < 0.0001)						
Head/Face	71	39.0	101	55.5	10	5.5
Neck/Chest	15	45.5	15	45.5	3	9.1
Back/Trunk	22	32.4	44	64.7	2	2.9
Extremities	141	40.1	208	59.1	3	0.9
Multiple Body Parts	21	28.0	48	64.0	6	8.0
Other/Not documented	0	0.0	1	33.3	2	66.7
Mechanism of Injury (Chi-square p-value < 0.0001)						
Road accident/MVA	107	53.5	80	40.0	13	6.5
Interpersonal/Domestic violence	53	34.2	94	60.6	8	5.2
Falls	22	14.7	126	84.0	2	1.3
Blunt force (non-penetrating)	18	30.0	41	68.3	1	1.7
Gunshot/Mechanical penetrating	6	26.1	17	73.9	0	0.0
Fire/heat	1	9.1	10	90.9	0	0.0
Self-harm	5	62.5	3	37.5	0	0.0
Other/Unknown	58	54.7	46	43.4	2	1.9
Specific Nature of Injury (Chi-square p-value < 0.0001)						
Soft Tissue Injury [a]	165	52.2	138	43.7	13	4.1
Fracture	43	25.6	124	73.8	1	0.6
TBI (Includes/skull fracture)	6	11.8	41	80.4	4	7.8
Stab/Puncture/Gunshot Wounds [b]	37	34.3	66	61.1	5	4.6
Polytrauma	8	25.8	21	67.7	2	6.5
Burns	1	12.5	7	87.5	0	0.0
Other/Unspecified	10	32.3	20	64.5	1	3.2

Discussion

The current state of trauma-related injuries, particularly those stemming from road accidents, presents a significant global health burden affecting nations across various income levels, including our local context. This research investigates explicitly injury patterns and patient outcomes observed in individuals seeking care at the AED unit of Georgetown Public Hospital in Guyana. Despite numerous studies emphasizing the importance of trauma registries, these invaluable tools for recording and comprehending injury patterns are often overlooked. Consequently, we incorporated this tool into our research. The accident and emergency department serves as a critical gateway for assessing and managing various medical conditions, including traumatic injuries. However, there exists a noticeable incongruity between the reported low incidence of trauma-related injuries and the total number of patients attending the AED unit. Understanding the factors contributing to this disparity is essential for optimizing resource allocation, improving patient care, and enhancing the efficiency of emergency healthcare delivery, as suggested in the study of Mutton S. and Stanley P. [9].

In our study, the total number of patients seen in the AED amounts to 25,925 individuals. Among these, 891 cases involved TRIs, with a subset of 713 cases, resulting in an incidence rate of 3.44%. This data underscores the prevalence of TRIs within the AED setting and provides essential insights into the healthcare needs related to trauma in our community. The findings under-

score significant seasonal fluctuations in trauma cases, with higher rates during summer months, particularly in August, September, and July, as opposed to December, showing the lowest incidence. This pattern aligns with previous research indicating a "trauma season" linked to increased outdoor activities and social factors [10,11]. Furthermore, the research conducted by Hind.,., *et al*. [12], supports the notion that trauma incidence peaks during the summer and influences the specific body parts affected during different seasons. Understanding these trends is crucial for effective resource management in healthcare [12].

Regarding admission time, our study noted heightened rates from morning to early afternoon, possibly influenced by local traffic congestion. This contrasts with evening shift patterns observed in other studies Pape-Köhler., *et al*. [13], which often see increased activity due to factors like alcohol-related incidents. Recognizing these patterns holds potential for injury prevention. Jo Røislien's study [14] further observed increased trauma admissions in spring and summer, with a notable rise during weekends attributed to leisure activities, warranting further research [14].

Self-referral to the AED unit is notably prevalent compared to referrals from healthcare institutions, suggesting a broader range of health conditions among patients with a likelihood of lower acuity ailments, in contrast to those directed by other healthcare facilities that typically necessitate immediate attention and specialized interventions. This starkly contrasts with findings from the study by Casey., *et al*. [15], where most cases were referrals from healthcare institutions.

It was observed that a more significant percentage of injuries were experienced by males, with females comprising a smaller share. Despite this gender distribution skew, motor vehicular accidents were notably higher among females compared to males, despite males having a higher overall incidence of injuries. Additionally, our demographic insights unveiled that Afro-Guyanese males and those who were single demonstrated the highest incidence of TRIs. Although we acknowledged a potential difference in injury patterns between genders, we observed it within our study population, which contrasts with findings from other studies [16]. Furthermore, our findings revealed that the majority of patients with trauma-related injuries were aged 18 and above, indicating a focus on an age range typically associated with the working class, similar to other studies by Sehat., *et al*., [17]. It is also noted in the data indicated that gender does not have a statistically significant impact on patient outcomes in our study. While there are observable differences in outcomes of male and female patients, such as admission rates, discharges, or mortality, these differences are not statistically significant. When interpreting the data, it's essential to consider the size of the sample, the types of injuries and conditions treated, and other potential confounding factors [17]. The predominant age group in the study population with TRIs was 25-44 years (35.6%), followed by ages 19-24 (18.1%) and 45-64 (18%). The least represented age groups were those under one-year (1.3%) and 1-4 years (4.3%), with a mean age of 33 (±19) years. These age-related trends in injury patterns and outcomes emphasize the importance of age-specific prevention strategies and targeted interventions to reduce the incidence and severity of TRIs across different age groups [18].

Injuries to the extremities stood out as the primary body part affected across age groups and genders, with head and face injuries following closely—a trend mirroring the findings of Stewart., *et al*. [18]. Noteworthy variations emerged, with falls more prevalent among females (26.1%), while interpersonal (domestic) violence was more common in males. Moreover, our study identified a significant occurrence of falls in individuals under 19 years old and those over 45 years old, aligning with the observations in Stewart., *et al*. [18]. This underscores the consistency of these patterns across different contexts, presenting an area that could be targeted for prevention.

Ultimately, our study's analysis of patient outcomes highlighted that motor vehicular accidents (MVA) stand out as the prevalent injury mechanism and the leading cause of mortality, similar to many epidemiological studies. Overall, the study provides valuable insights into the epidemiology of TRIs and patient outcomes in the study setting. The majority of patients (58.5%) were admitted to various specialty clinics, while 38% were discharged, and 4% either died on arrival or during medical intervention. By understanding the factors influencing injury patterns, admission rates, and patient outcomes, healthcare providers and policymakers can develop more effective strategies for prevention, management, and resource allocation, ultimately improving the quality of care for trauma patients [15].

Regarding patient outcomes, the majority were admitted, with a notable concentration in Orthopedic and surgical wards, mirroring the research findings of Casey., *et al*. [15]. Nevertheless, within our study population, a significant portion of our study population was either admitted to the hospital or discharged. Notably, patients with soft tissue injuries were frequently discharged, while those with fractures and burns were more likely to be accepted for further medical care.

Regarding patient outcomes by age group, our study indicates a potential association between age group and patient outcomes, as suggested by the observed p-value of 0.058, which is just above the conventional threshold of 0.05. While this finding falls just outside the traditional significance level, it remains close enough to warrant consideration for practical application. Various factors, including the severity of injuries, underlying health conditions, timeliness of medical care, and other contributing factors, could influence the observed differences in outcomes between age groups.

The study's leverages existing information on TRI trends and patterns in Guyana and extends its scope to disseminate this knowledge among critical stakeholders later. Better recognition of these patterns can potentially limit any risk of TRIs, which are paramount in designing better systems, fostering education, and better supportive collaboration among critical players for prevention and trauma care. The aim is to facilitate collaborative efforts in developing preventive and rehabilitative programs. This collaborative approach will strategically allocate limited resources where they are most needed, contributing to the formulation of legislation that can effectively reduce the burden and consequences of TRIs on the health and well-being of the nation.

Limitations

While the retrospective design has advantages and is often under-utilized, the study design has some limitations, including the following. First, there is a possibility of missing some or incomplete information from charts and electronic databases since the original use of the data is more clinical files only and not primarily for research. Authors Mutto S. and Stanley P., [9] advocated continuous training for registry staff and the establishment of a data validation mechanism to guarantee the functionality and precision of trauma-related registries.

Next, there's a chance of encountering challenges in understanding information because of unclear writing or the use of technical language. To mitigate this issue, it's advisable to implement standardized documentation guidelines or templates that promote clear and concise writing. Moreover, transitioning to a fully computerized data registry system can also improve the clarity and accessibility of information. Thirdly, considering that the study serves as a preliminary investigation primarily concentrating on the latter part of the year, additional research is warranted to conduct a multi-year study. This expanded scope would enable the identification of persistent patterns and fluctuations in trauma occurrences, thus enhancing preparedness to address evolving challenges and intricacies.

Finally, this study examining the frequency of trauma-related injuries concentrates on the largest referral hospital in central Georgetown, Guyana. Nonetheless, the GPHC serves as the primary national referral hospital and may offer a more representative sample, albeit not encompassing all hospitals in the country. Unifying trauma registries across all health institutions in Guyana will streamline data collection, allowing for a better understanding of the country's trauma landscape and a more effective response to public health needs.

Conclusion

This study highlights the significant burden of trauma-related injuries in Guyana, particularly those resulting from road accidents. By analyzing patient data from the AED of GPHC, we identified key trends in injury patterns, seasonal variations, and demographic disparities. The findings underscore the need for improved trauma registries, resource allocation, and targeted prevention strategies to mitigate the impact of TRIs on public health.

Our study confirms that TRIs predominantly affect working-age adults, with motor vehicular accidents serving as the leading cause of both injury and mortality. Notably, males experienced a higher overall incidence of trauma, although females were more frequently involved in motor vehicular accidents. Additionally, injuries to the extremities and head were the most common across all age groups and genders. The observed seasonal trends, with peaks during summer months and increased weekend admissions, align with global patterns and emphasize the importance of strategic planning in emergency healthcare services.

Given the limitations of the study, including potential data gaps and the focus on a single referral hospital, future research should expand the scope to a nationwide trauma registry. Standardizing trauma data collection across healthcare institutions would enhance surveillance efforts, facilitate better policy-making, and improve trauma care interventions. Strengthening collaboration among healthcare providers, policymakers, and community stakeholders will be crucial in reducing the incidence and severity of TRIs. Ultimately, the insights gained from this research can inform public health strategies aimed at fostering a safer and more resilient healthcare system in Guyana.

Author Contributions

All fifth authors contributed substantially to the conception and design of the work, as well as the acquisition, analysis, and interpretation of data. All authors reviewed the final submission. They

also agreed to be accountable for all aspects of the work, ensuring that any questions related to its accuracy or integrity are properly addressed.

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Institutional Review Board Statement

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Data Availability Statement

Data is available on reasonable requests from the corresponding Author.

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Conflicts of Interest

The authors declare no conflicts of Interests.

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