

Injury Surveillance in Trinidad: An Accident and Emergency Based Injury Surveillance System at the San Fernando General Hospital

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ABSTRACT

Objective: Injuries are a significant cause of morbidity and mortality worldwide. Injuries disproportionately affect people living in low and middle income countries, including the Caribbean; however, little is known about the epidemiology of injuries in these areas. An Accident and Emergency (A&E) Department injury surveillance system was established at the San Fernando General Hospital, Trinidad and Tobago, to address this important data gap.

Methods: A detailed overview of the objectives, data collection methods, and inherent strengths and limitations of this surveillance system are presented, along with results of an analysis of data collected during the first three years of operations (from 2002 to 2004).

Results: Trained hospital staff collect a variety of injury/poisoning, demographic and clinical data on nearly 20 000 patients presenting each year with injury to the A&E Department. The total number of injuries in men was almost twice that in women.

The majority of injuries were seen in those 25–44-years of age. Falls, other blunt force, stab/cut, traffic injury and poisoning represented the leading causes of injury. Nearly half of all the injuries occurred in the home, with the street/highway and work environments also accounting for an appreciable number of injuries. The majority of injuries were reported as unintentional.

Conclusion: Injuries represent an important population health and health services issue in South Trinidad. Data from the A&E Department injury surveillance system represent an important resource to inform evidence-based health policy decisions on injury prevention and public health resource allocation.

Vigilancia de las Lesiones en Trinidad: un Sistema de Vigilancia de Lesiones Basado en Emergencias y Accidentes en el Hospital General San Fernando

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RESUMEN

Objetivo: Las lesiones son una causa significativa de morbilidad y mortalidad a nivel mundial. Las lesiones afectan de manera desproporcionada a la gente que vive en países de ingresos bajos y medios, incluyendo el Caribe. Sin embargo, poco se sabe acerca de la epidemiología de las lesiones en estas áreas. Con el propósito de cubrir esta laguna de importantes datos epidemiológicos, se estableció un sistema de vigilancia de lesiones en forma de Departamento de Accidentes y Emergencias (A&E), en el Hospital General San Fernando, en Trinidad y Tobago.

Métodos: Se presenta un resumen detallado de los objetivos, métodos de recopilación de datos, así como las fortalezas y limitaciones inherentes de este sistema de vigilancia, junto con los resultados de un análisis de los datos recogidos durante los primeros tres años de operaciones (desde 2002 al 2004).

Resultados: Personal entrenado del hospital recogió una variedad de datos de lesiones/envenenamientos, así como datos demográficos y clínicos de casi 20000 pacientes que acudían con lesiones cada año al Departamento de A&E. El número total de lesiones en los hombres fue casi el

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dobles que en las mujeres. La mayoría de las lesiones se veían en personas de 25 a 44 años de edad. Caídas, golpes contundentes, cortadas/cuchilladas, lesiones por accidentes de tráfico y envenenamiento, representan las principales causas de lesión. Casi la mitad de todas las lesiones ocurrieron en los hogares, seguidas de las producidas en la calle/autopista y los ambientes laborales, también responsables de un número apreciable de lesiones. La mayor parte de las lesiones fueron reportadas como no intencionales.

Conclusión: *Las lesiones representan un asunto importante para los servicios de salud y la salud de la población del sur de Trinidad. Los datos del sistema de vigilancia de lesiones del Departamento de A&E, representan un importante recurso informativo para las decisiones sobre políticas de salud basadas en evidencias a la hora de asignar recursos para la salud pública y la prevención de lesiones.*

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INTRODUCTION

Injuries are a significant cause of morbidity and mortality. It is estimated that over five million deaths each year are attributable to injuries worldwide, accounting for some 12% of the global burden of disease (1, 2). Among the leading causes of death and disability from injury are road traffic injuries, self-inflicted injuries and interpersonal violence and drowning (3). Injuries also represent a large burden to the healthcare system and society (2). Due to a wide range of social and environmental factors, injuries are seen to particularly affect low and middle income countries (1, 2).

In Trinidad and Tobago (4), deaths due to external causes represent the fourth leading cause of mortality, of which suicide/self-inflicted injury (27.4%), motor vehicle traffic accidents (23.9%), homicide (18.3%), and accidental drowning/submersion (9.0%) are among the leading contributors (5). Injuries represent an even larger proportion of deaths among younger individuals, with approximately 40% of deaths in those aged 15–24 years being injury-related (5). A greater proportion of individuals experienced non-fatal injuries, many of which result in permanent disability, depression or substance abuse (2).

Few data sources on incident injuries exist in Trinidad and Tobago to inform the injury prevention decision-making process. To address this important data gap, the Accident and Emergency (A&E) Department at the San Fernando General Hospital established an injury surveillance system in partnership with the Caribbean Epidemiology Centre (CAREC) and the Rotary Club of San Fernando South. Unique in its inception, the involvement and dedication of a variety of stakeholders, including non-governmental organization, local and national government and community groups, all played key roles in the successful implementation and ongoing operations of the system. Currently, this injury surveillance system remains the sole surveillance system of its kind in Trinidad and Tobago and one of few in the region (6).

The injury surveillance system was implemented in order to 1) characterize the number and nature of injuries presenting to the A&E Department of the San Fernando General Hospital, 2) provide data to inform decision-making related to injury prevention and resource allocation, 3) identify priority areas for intervention, 4) monitor and evaluate

the effectiveness of prevention programmes over time and 5) serve as a pilot site for a national injury surveillance programme. This paper provides an overview of the establishment of the system and data collected during the first three years of operations (2002–2004). A detailed examination of the aetiology of specific injury subtypes will be presented elsewhere.

SUBJECTS AND METHODS

The San Fernando General Hospital is within the jurisdiction of the South West Regional Health Authority (SWRHA) with a catchment area of approximately 500 000 people that reaches from Couva and Tabaquite in the North to Icacos and Moruga in the South. The San Fernando General Hospital is a 660 bed publicly run teaching hospital, and is the main trauma centre for the South West Region. San Fernando is the second largest city in Trinidad.

A case is any patient presenting to the A&E Department with an injury (either an incident case or a repeat visit for a previous injury) as defined by the World Health Organization (7, 8). The case definition includes drownings, hypothermia, strangulation, decompression sickness, poisonings and neglect, but excludes chronic conditions such as carpal tunnel syndrome, chronic back pain, mental conditions, as well as food poisoning of an infectious origin. In the event of an individual sustaining multiple injuries, the injury that is most severe is captured by the surveillance system.

Data collection at the A&E Department began in February 2002. The South West Regional Health Authority Ethics Committee reviewed and approved the injury surveillance system's operations. A description of the injury surveillance process is given in Fig 1. The patient may present to the A&E Department in one of two ways: 1) an ambulatory patient would present to the triaging nurse who identifies the injury, or 2) a non-ambulatory patient would proceed first to the resuscitation room for treatment, following which injury identification would occur. The one-page paper injury surveillance form is maintained as part of the patient file, and is completed in three parts by trained hospital staff. Hospital staff were trained using a 'train the trainer' format, and are provided with ongoing reinforcement on the purpose of the system, data collection methods and variable definitions, and

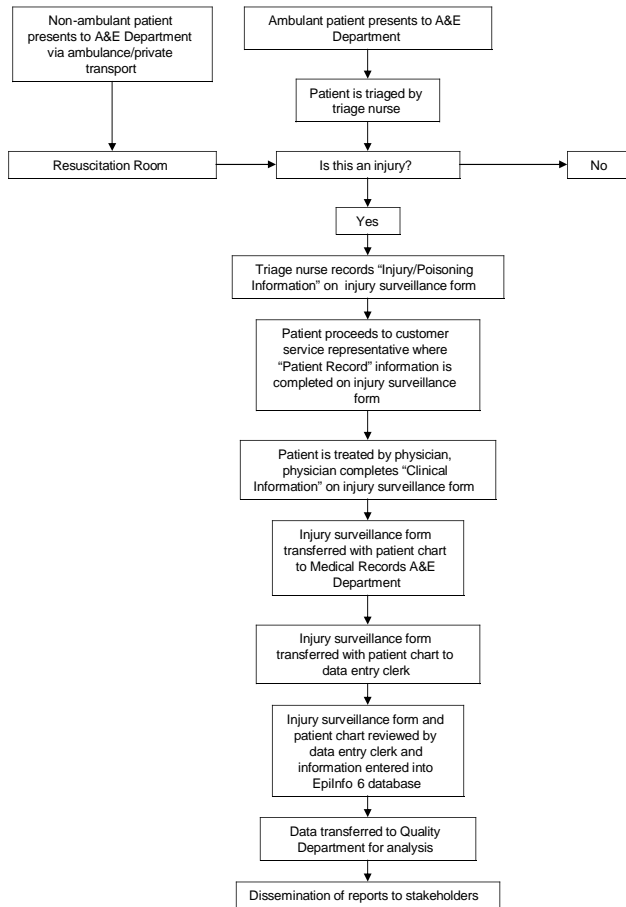


Fig. 1: A&E Department injury surveillance data collection process.

results generated by the system. The triage nurse completes the “Injury/Poisoning Information” section, the customer service representative completes the “Patient Record” section, and the attending physician completes the “Clinical Information” section. In the event that the patient is unable to participate in the injury surveillance data collection process (such as an unconscious patient or young child, for example), proxies (such as next of kin) are used to aid in data collection.

Following completion, the injury surveillance form is transferred to a data entry clerk where the information is reviewed and subsequently entered into an EpiInfo 6 database. The data entry clerk verifies that the injury surveillance form is complete and that the information on the form is in concordance with the physician’s notes on the patient chart. The software is programmed so as not to allow values that are out of range and has skip patterns to aid in data entry. Since October 2004, data have been double entered as a further quality control procedure. Regular reports are generated by the Quality Department of the San Fernando General Hospital, and are disseminated to a variety of stakeholders within the Hospital, the SWRHA, the Ministry of Health and

CAREC. A training manual and reference materials are provided at each point in the data collection and entry process.

The design of the one-page injury surveillance form was based on both the Canadian Hospitals Injury Reporting and Prevention Programme (CHIRPP) and the Australian National Injury Programme. The “Injury/Poisoning Information” portion of the form consists of fields specific to the injury presented. Open-ended fields for date and time of injury occurrence are recorded, along with a closed-ended selection of fields to ascertain the intent of the injury (unintentional, intentional interpersonal or self-harm), the mechanism of injury, the place of occurrence, the activity during injury, nature of injury, type of injury (single or multiple), severity of the injury (Five Point Canadian Acuity Scale) and psychoactive substance use (alcohol, marijuana, cocaine, other).

A traffic injury subsection ascertains more detailed information related to the traffic injury including mode of transport, type of road user and seatbelt use. An intentional interpersonal subsection ascertains detailed information related to the context of the injury, the relationship of the injured with the perpetrator and the object used to cause the injury.

The “Patient Record” section consists of patient administrative and demographic data. The administrative section consists of open-ended fields for the A&E Department registration number as well as the date and time of presentation. The demographic section consists of open-ended fields for patient name, date of birth/age, address, occupation, place of work, nationality and next of kin. The closed-ended section consists of fields for gender, ethnic group, religion, employment status, education, mode of transport to the hospital and reason for visit (incident visit or follow-up visit).

The “Clinical Information” section contains open-ended fields for blood pressure, temperature, pulse, respiration, revised trauma score, total paediatric trauma score, incident summary, discharge summary, medication prescribed, referral, ICD-10 diagnostic code and discharge date and time. Closed-ended fields are used to record clinician opinion of relation between injury and current medication or psychoactive substance use, past medical history and clinical outcome.

RESULTS

Table 1 provides an overview of the epidemiology of injuries presenting to the A&E Department of the San Fernando General Hospital from February 2002 to December 2004. Records with missing gender (170) and reason for visit other than an incident injury (538) were excluded. Statistical analysis was conducted using SAS Version 9.1 (9).

A total of 58 523 incident injuries presented to the A&E Department from February 2002 to December 2004,

Table 1: Overview of injuries presenting to the A&E Department, San Fernando General Hospital, 2002–2004

Characteristic	Men No. (%)	Women No. (%)	Total No. (%)
Age (years)			
0–4	1 675 (4.3)	1 272 (6.4)	2 947 (5.0)
5–14	5 008 (13.0)	2 512 (12.6)	7 520 (12.8)
15–24	9 667 (25.0)	3 980 (20.0)	13 647 (23.3)
25–44	13 727 (35.5)	5 845 (29.4)	19 572 (33.4)
45–64	5 846 (15.1)	3 903 (19.7)	9 749 (16.7)
65+	1 482 (3.8)	1 729 (8.7)	3 211 (5.5)
Unknown	1 265 (3.3)	612 (3.1)	1 877 (3.2)
Mechanism			
Fall	10 593 (27.4)	7 711 (38.8)	18 304 (31.3)
Other Blunt Force	10 302 (26.6)	4 121 (20.8)	14 423 (24.6)
Stab or Cut	5 274 (13.6)	1 400 (7.1)	6 674 (11.4)
Traffic Injury	4 306 (11.1)	2 207 (11.1)	6 513 (11.1)
Poisoning	1 514 (3.9)	1 408 (7.1)	2 922 (5.0)
Bitten by Animal	517 (1.3)	377 (1.9)	894 (1.5)
Fire, Heat	312 (0.8)	208 (1.0)	520 (0.9)
Bitten by Person	116 (0.3)	88 (0.4)	204 (0.3)
Gun Shot	170 (0.4)	23 (0.1)	193 (0.3)
Sexual Assault	18 (0.0)	26 (0.1)	44 (0.1)
Choking or Hanging	25 (0.1)	18 (0.1)	43 (0.1)
Other	1 903 (4.9)	767 (3.9)	2 670 (4.6)
Unknown	3 620 (9.4)	1 499 (7.6)	5 119 (8.7)
Location			
Home	13 189 (34.1)	11 529 (58.1)	24 718 (42.2)
Street/Highway	9 355 (24.2)	4 019 (20.2)	13 374 (22.8)
Work	6 656 (17.2)	850 (4.3)	7 506 (12.8)
Sports/Athletics Area	1 956 (5.1)	235 (1.2)	2 191 (3.7)
School	1 463 (3.8)	681 (3.4)	2 144 (3.7)
Other	1 274 (3.3)	447 (2.2)	1 721 (2.9)
Unknown	4 777 (12.4)	2 092 (10.5)	6 869 (11.7)
Intent			
Unintentional	29 695 (76.8)	16 273 (81.9)	45 968 (78.6)
Intentional Interpersonal	7 142 (18.5)	2 639 (13.3)	9 781 (16.7)
Intentional Self-Harm	275 (0.7)	310 (1.6)	585 (1.0)
Unknown	1 558 (4.0)	631 (3.2)	2,189 (3.7)
Clinical Outcome			
Discharged	24 159 (62.5)	13 302 (67.0)	37 461 (64.0)
Admitted	9 465 (24.5)	4 196 (21.1)	13 661 (23.3)
Left Without Being Seen	4 645 (12.0)	2 153 (10.8)	6 798 (11.6)
Other / Unknown	401 (1.0)	202 (1.0)	603 (1.0)
Total	38 670 (100)	19 853 (100)	58 523 (100)

representing approximately 23.1% of all A&E visits. The total number of incident visits captured by year was 20 233 in 2002, with a further 18 964 and 19 326 injuries recorded in 2003 and 2004, respectively. Men presented with nearly double the number of injuries compared to women. The majority of injuries were seen in those 25–44 years of age, followed by the 15–24 and 45–64-year old age groups.

Falls, other blunt force, stab/cut, traffic injury and poisoning represented the leading causes of injury. Men experienced a greater proportion of injuries through other blunt force and stab/cut than women, while women reported a greater proportion of falls and poisonings than men. The rank ordering of leading mechanisms of injury was relatively consistent across age categories with a few exceptions. In the

youngest age group (up to 4 years of age), poisoning was found to represent the third leading mechanism of injury (9.1%) after falls (51.4%) and other blunt force (12.4%). In both the 15–24 and 25–44-year old age groups, other blunt force (29.2 and 29.0%, respectively) represented the first leading mechanism of injury, with falls representing the second (20.1 and 23.1%, respectively). Additionally, in the 25–44-year old age group, traffic injuries (13.0%), as opposed to stab/cut (11.4%), represented the third leading mechanism of injury.

Nearly half of all injuries occurred in the home, followed by the street/highway, and the work environment. Women were much more frequently injured in the home than men. However, a greater proportion of men were injured while at work. Nearly 80% of all injuries were reported as unintentional injuries. A total of 16.7% of injuries were intentional interpersonal injuries, of which the majority occurred in males. Intentional self-harm accounted for 1.0% of injuries.

The majority of injuries were discharged from the A&E Department following treatment. Nearly a quarter of injuries required further hospital admission and 6 798 injuries left the A&E Department without being seen by a physician. Gun shots (66.8%), fire/heat (39.6%), poisoning (33.8%), falls (23.8%), traffic injuries (23.0%), and other blunt force (21.0%) represented the types of injuries with the greatest proportion requiring further hospital admission.

Figure 2a presents the distribution of month-of-injury presentation to the A&E Department. Although the occur-

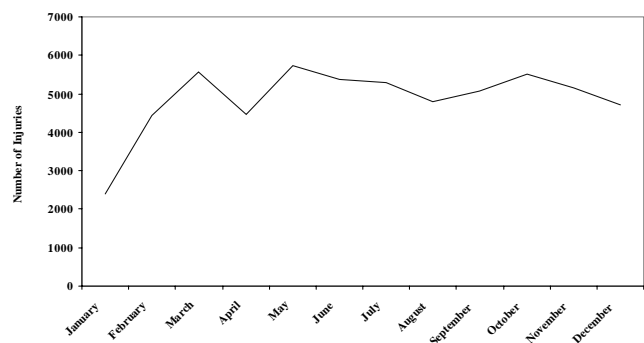


Fig. 2: Temporal description of injury presentation to the A&E department, San Fernando General Hospital, 2002–2004
January data exists only for 2003, 2004.

2a: Month of injury presentation

rence of injury generally appeared uniform over time, a slight increase in the number of injury visits to the A&E Department was observed in March, May and October, whereas February and April were associated with the least number of visits. Upon examination of injury presentation by day of week (Fig 2b), a slight increase in the number of injuries was observed during the weekend (Saturday, Sunday and Monday).

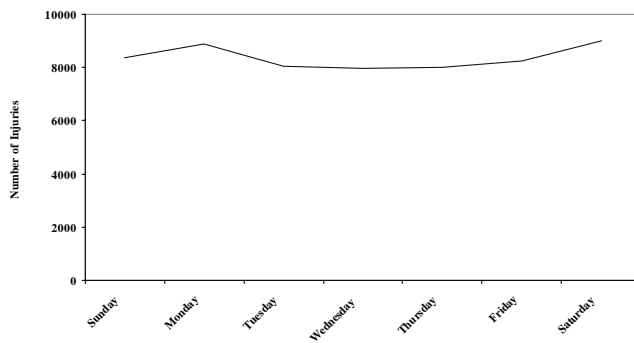


Fig. 2b: Day of week of injury presentation.

DISCUSSION

Injuries represent an important source of morbidity and mortality in Trinidad. Although injuries are acknowledged as an important population health issue, little is currently known about the epidemiology of injuries in the region. The injury surveillance system has been in full operation for several years, with nearly 20 000 incident injuries captured by the surveillance system each year. The majority of injuries were seen to occur in males, particularly those between 25 and 44 years of age. Falls and injuries from other blunt force represented over half of all injuries. The most common location of injury was either the home or the street. However, injuries at work also represented an important place of injury in men. The majority of injuries presenting at the A&E Department were reported as unintentional, although over 10 000 intentional injuries presented over the analysis period.

The importance of violence and injuries as a health and economic burden in the Caribbean was recently recognized by the Caribbean Commission on Health and Development (10). From a population health perspective, adopting a broader view of injury aetiology, including possible roles for a range of risk factors (including social, environmental or behavioural) acting at multiple levels may be considered (11). Particular attention must also be paid to the ability of the health services to respond to injuries once they have occurred. Indeed, a large number of injured patients presented to the A&E Department but subsequently left without being seen by a physician. Although it is not possible to determine why such patients left based on the data collected here, it is likely however that a combination of factors, including waiting time, may have been involved.

Although certain similarities appear to exist between the profiles of injury in South West Trinidad and those occurring internationally, it is important to consider the unique profile of contributing factors and distinct health and social outcomes of injury in Trinidad. It is well recognized that males, particularly young males, experience greater rates of injury around the globe likely due in part to riskier behavioural patterns, perceptions and attitudes (12). Falls were also seen to represent an important mechanism of injury

among a variety of different geographic and demographic populations (13–16). Further evaluation of the specific individual and societal level factors contributing to injuries in South West Trinidad will identify specific high priority areas to implement intervention strategies.

Another important source of injury data in the Caribbean is the multi-hospital Emergency Department surveillance system in Jamaica (17). Although an injury surveillance system was previously initiated in the Bahamas (18), operation of the system was not sustained. Other targeted studies have been conducted in Trinidad and Tobago and in the Caribbean to examine specific injuries or subpopulations (19–25). A detailed database on traffic collisions and injury is also maintained by the Traffic and Highway Patrol Unit of the Trinidad and Tobago Police Service (26). Establishing linkages between these two databases in Trinidad and Tobago may provide unique analytic opportunities for the study of traffic injuries, as well as providing a potential resource for cross-validation of data collected.

The surveillance system is located in the largest public hospital and the main trauma centre in the South West Region. The patient record form is completed by trained hospital staff, and a comprehensive set of demographic data and data related to the nature and circumstances of the injury is collected. A previous study examined the concordance of data on the original injury surveillance form to the information entered into the electronic database from the years 2002 to 2003 for 13 key variables and found very low error rates [from 0.0% to 4.0%] (27). More recently, injury surveillance data have been double entered into the electronic database to enhance data quality. Although a reasonable proportion of ‘missing’ or ‘unknown’ entries were found for the key demographic and injury-related variables presented here, higher values were found for certain other variables captured; this is likely due at least in part to repetition on other forms, difficulties in collection, high time pressures on staff or insufficient reinforcement and training (27).

Establishing and maintaining systems of this type can be associated with many challenges in both developed and developing countries (18). Although the San Fernando General Hospital is the main trauma centre for the South West Region, injured patients accessing treatment at other facilities are currently not captured by the surveillance system. Consequently, a number of population groups may be under-represented. The injury profile may differ substantially by geographic location due to differences in socio-economic, industrial and environmental profiles of different Regions. For example, middle to upper income earners may be more likely to seek treatment, particularly for minor injuries, at one of five private facilities that exist within South West Trinidad. Patients with minor injuries may also seek treatment at one of 33 local Health Centres in the Region. Fatal injuries would not be captured by this system, although they would be included in tabulations of vital statistics. Occupational injuries in workers in the petroleum industry are treated at a semi-

private hospital in the South West Region. The South West is one of five Regional Health Authorities in the country.

Other limitations may relate to biases in reporting of data for certain variables. For example, intentional injuries may be under-reported. There may also exist challenges in data collection for children, the elderly, and patients with certain mental impairments. Although proxy respondents may be used for injury surveillance data collection, the extent of their use is limited.

In conclusion, data collected through the A&E Department injury surveillance system at the San Fernando General Hospital demonstrate the importance of injuries as a population health and health services issue in Trinidad and Tobago. Future expansion of the surveillance system to other parts of Trinidad and Tobago, along with linkages with other routinely collected data sources, would provide a more comprehensive view of injuries in the country. In parallel, exploring the expansion of injury surveillance programmes within the wider Caribbean should also be considered. Further research on the economic and social impact of injuries, the design and evaluation of multi-sectoral injury prevention initiatives, and monitoring trends in injury over time is also needed. Further examination of the aetiology of injuries in high priority populations in Trinidad, along with an evaluation of related perceptions and attitudes towards injury, will also aid in developing appropriate intervention strategies.

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