

# Sharp Force Injuries at the University Hospital of the West Indies, Kingston, Jamaica: A Seventeen-year Autopsy Review

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## ABSTRACT

**Objectives:** This study aimed to ascertain the prevalence and patterns of fatal sharp force injuries, victims' demographics, cause of death and average survival time at the University Hospital of the West Indies (UHWI), Kingston, Jamaica.

**Methods:** The autopsy records for 1990–2010 were searched for fatal cases of sharp force injuries. The records for 1998–2001 were not located. A 17-year retrospective analysis was therefore performed and findings for the two periods, 1990–1997 and 2002–2010 were compared. All data were obtained from the provisional anatomical diagnoses (PAD) autopsy reports.

**Results:** During the 17-year period, 57/4264 autopsies were performed for sharp force injuries, yielding an overall autopsy prevalence rate of 1.34%; 1.25%, 26/2086 (95% CI 0.77, 1.73) in Period 1 and 1.42%, 31/2178 (95% CI 0.92, 1.92) in Period 2. The majority were males (91.1%), in the age group 15–39 years (77%), mean age of 30.9 years (range = 17–65 years). Stab wounds predominated (91.3%) and the chest was the area most frequently stabbed (42.1%). In the 24 fatalities due to chest injuries only, eight (33.3%) had injuries to the heart alone. Forty-five patients (79.0%) died within 24 hours from exsanguination. Injury documentation at autopsy was deficient.

**Conclusion:** Stabbing was the most common sharp force injury, mainly involving the chest, and young men were at greatest risk. Most patients died from exsanguination within 24 hours of admission. Introduction of synoptic-type reports for both clinical and autopsy examination may improve documentation.

**Keywords:** Jamaica, sharp force injuries

# Heridas por Armas Blancas en el Hospital Universitario de West Indies, Kingston, Jamaica: 17 Años de Examen de Autopsias

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## RESUMEN

**Objetivos:** Este estudio tuvo por objetivo determinar la prevalencia y los patrones de las heridas por fuerzas de instrumentos afilados (armas blancas), la demografía de las víctimas, las causas de muerte, y el tiempo promedio de supervivencia, en el Hospital Universitario de West Indies (HUWI), Kingston, Jamaica.

**Métodos:** Se analizaron los registros de autopsia de 1990–2010 en busca de casos fatales por heridas por instrumento afilado. Los registros de 1998–2001 no fueron localizados. Por consiguiente, se realizó un análisis retrospectivo de 17 años, y se compararon los resultados de los dos periodos, 1990–1997 y 2002–2010. Todos los datos se obtuvieron de los reportes de autopsia de diagnósticos anatómicos provisionales (DAP).

**Resultados:** Durante el periodo de 17 años, se realizaron 57/4264 autopsias a casos de heridas por fuerzas de instrumentos afilados, para una tasa general de prevalencia de autopsia de 1.34%; 1.25 por ciento, 26/2086 (CI 95%: 0.77, 1.73) en el Periodo 1 y 1.42%, 31/2178 (CI 95% 0.92, 1.92) en el Periodo 2. La mayoría eran varones (91.1%), en el grupo de edad de 15–39 años (77%), edad promedio 30.9 años (rango = 17–65 años). Predominaron las heridas penetrantes, (91.3%), y el pecho

*fue la zona más frecuentemente apuñalada (42.1%). De los 24 casos de muertes debido sólo a heridas en el pecho, ocho (33.3%) tuvieron heridas solamente en el corazón. Cuarenta y cinco pacientes (79.0%) murieron dentro de las 24 horas tras recibir las heridas, a causa del desangramiento. La documentación de las heridas en la realización de la autopsia, fue deficiente.*

**Conclusión:** *El apuñalamiento fue la herida por fuerza afilada más común, asociada principalmente con el pecho, y los jóvenes tuvieron un riesgo mayor. La mayor parte de los pacientes murió de hemorragia dentro de las 24 horas que siguieron a su ingreso. La introducción de reportes de tipo sinóptico, tanto para el examen clínico como para el examen de la autopsia, pueden contribuir a mejorar la documentación.*

**Palabras claves:** Jamaica, heridas por fuerza de instrumento afilado

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## INTRODUCTION

The prevalence of violence in Jamaica has been previously reported by Lemard and Hemenway (1). The drain on scarce hospital and national resources by an imminently preventable problem has been recognized and lamented (2–4). In the study by Lemard and Hemenway, they found that the most popular implements used in homicides between 1998 and 2002 were guns (66%), knives (19%) and machete or ice pick [6%] (1). A similar pattern was reflected in hospital admissions for penetrating injuries (2, 3).

Despite decreasing rates locally and internationally (5), the autopsy remains a vital tool in the evaluation of violent injuries and unnatural cause of death (5–11). Coroner's autopsies are important but under-utilized in elucidating the epidemiology of violent and unnatural deaths. The information gleaned may be critical, particularly when the consequences of violence decimate scarce resources in developing nations.

The purpose of this study was to determine the prevalence and patterns of sharp force injuries in an autopsy population at The University Hospital of the West Indies (UHWI), Kingston, Jamaica, to describe the demographics of the victims and the resultant wounds and, further, to determine the average survival time post admission.

## SUBJECTS AND METHODS

The autopsy records of the Department of Pathology, The University of the West Indies (UWI), were reviewed for all cases of patients who died at the UHWI from sharp force injuries between 1990 and 2010. Despite a diligent search, no records were found for 1998–2001. Autopsies performed on bodies that were not involved in sharp force injuries during the periods of 1990–1997 and 2001–2005 were excluded from this study, as were deaths from gunshot wounds. A 17-year retrospective review of the autopsy reports of patients who died from sharp force injuries was therefore performed, excluding these years 1998–2001, and the findings in the two periods (1990–1997 and 2002–2010) were compared.

Sharp force wounds are defined as incised wounds (cuts), penetrating incised wounds (stab wounds), chop

wounds, non-human bites and venepunctures for medical or illicit use (13, 14). An incised wound is a superficial wound in which the size of the wound on the surface is larger than the depth of the wound, while the penetrating wound is deeper than its surface length. A chop wound is a wound caused by a heavy weapon or instrument which has at least one sharp cutting edge (5, 11, 13). Chop wounds often injure the underlying bone and imply the utilization of extreme force.

All data were obtained from the provisional anatomical diagnoses (PAD) postmortem reports from the Pathology Department, UWI. Each PAD postmortem report gave the major findings at autopsy, provided summaries of the victims' history and treatment and, finally, proposed a cause of death. The variables examined included patient's demographics, types of sharp force injuries inflicted, implements used, anatomical areas injured, survival time after admission, and motive for the injuries. The frequencies were calculated and the data tabulated.

## RESULTS

The total number of autopsies performed in the 17-year period was 4264. The total number of cases of sharp force injuries was 57, yielding an average autopsy prevalence rate for sharp force injuries of 1.34%. The rates for the two periods under study were 1.25%, 26/2086 (95% CI 0.77, 1.73) in Period 1 and 1.42%, 31/2178 (95% CI 0.92, 1.92) in Period 2 (Table 1). There was no significant difference between the rates for the two periods.

The majority were males (91.1%), in the age group 15–39 years (77%), with a mean age of 30.9 years [range = 17–65 years] (Fig. 1). There were five females in this study. The types of implements and the motives for the incidents could not be ascertained from the postmortem reports. Stab wounds were the commonest form of fatal sharp force injuries, occurring in 89.5% of the cases (Fig. 2A). The chest was the area most frequently stabbed (42.1%), followed by the abdomen [12.3%] (Fig. 2B). The heart was the most frequent sole organ injured (33.3%) in those with only chest wounds, and haemothorax was present in 79.1% (Table 2).

Table 1: Number of autopsies performed at University Hospital of the West Indies 1990–2010

Year	No. of autopsies on sharp force injuries	Total number of cases
1990	4	289
1991	1	244
1992	2	265
1993	1	225
1994	4	246
1995	9	268
1996	1	270
1997	4	279
1998	?	249
1999	?	212
2000	?	235
2001	?	280
2002	1	239
2003	2	278
2004	3	243
2005	8	303
2006	3	250
2007	7	240
2008	3	217
2009	2	221
2010	2	187
<b>Total</b>	<b>57</b>	<b>5240</b>

The highlighted areas indicate the years for which the provisional anatomical diagnoses autopsy reports were not located.

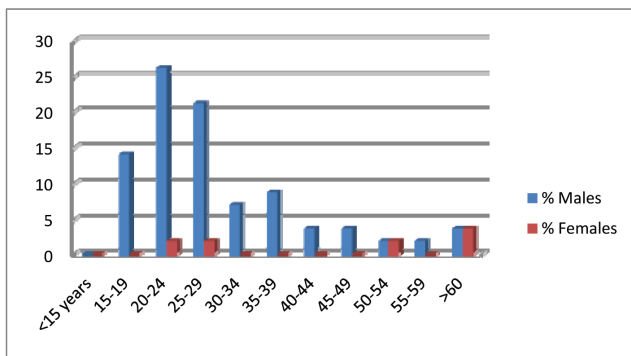


Fig. 1: Demographics of victims involved in sharp force injuries (n = 52).

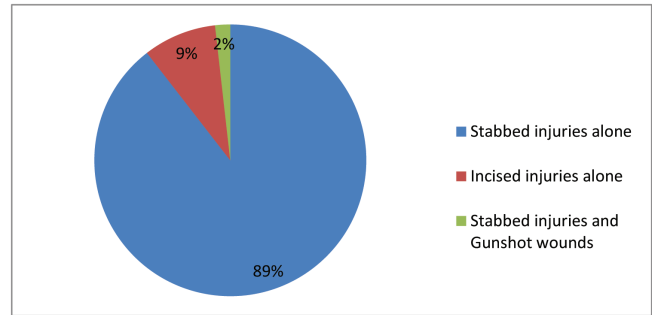


Fig. 2A: Type of sharp force injury inflicted (n = 57).

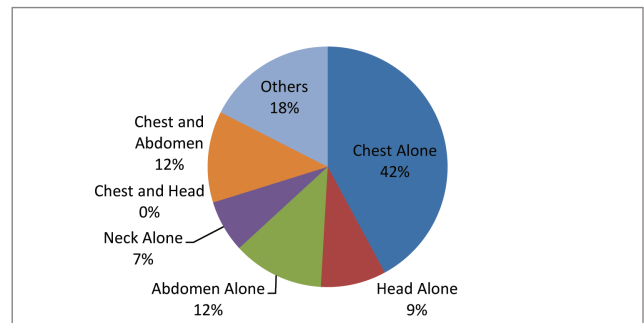


Fig. 2B: Area of the body injured in victims with sharp force injury.

Table 2: Type of viscera injured and consequences in victims with only chest wounds

Viscera injured		Consequence			
Type of organ involved	n	%	Pleural cavity	n	%
Lung alone	3	12.5	Normal	1	4.2
Heart alone	8	33.3	Haemothorax	19	79.1
Major blood vessel	4	16.7	Pneumothorax	1	4.2
Not documented	2	8.3	Not documented	3	12.5
Combined (more than one)	7	29.2			
<b>Total</b>	<b>24</b>	<b>100</b>		<b>24</b>	<b>100</b>

The majority of patients died from exsanguination (79%) within 24 hours of hospital admission (Table 3).

Table 3: Mode of death and period of survival

Mode of death	n	%	Period of survival	n	%
Shock with haemorrhage (exsanguination)	45	79	Instantaneous death	1	1.7
Septicaemia	2	3.5	Died within 24 hours	45	79
Brain injury	2	3.5	Survived beyond 24 hours	8	14
Brain injury and haemorrhage	4	7	Unknown	3	5.3
Others	4	7			
<b>Total</b>	<b>57</b>	<b>100</b>		<b>57</b>	<b>100</b>

## DISCUSSION

The overall prevalence of 1.34% for sharp force injuries in this autopsy population is low and below the clinical prevalence reported in Jamaica by Lemard and Hemenway (1), as this represents only fatal cases. In that study, sharp force injuries accounted for the second highest cause of penetrating injuries (25%), behind gunshot wounds (66%). Studies have shown that the commonest implements used in sharp force injuries were knives, ice picks and machetes. For penetrating cardiac injuries at the Kingston Public Hospital, Jamaica, between 1982 and 1989, knives (70%), ice picks (15%) and guns (9%) were the commonest implements used (4). A similar distribution of implements was noted in a previous study on penetrating injuries to the heart, in which fatality was present in 2/3 cases with injury to the left ventricle (12). In that study and one from South Africa (14), the age distribution and male preponderance were similar to the findings in this study.

The nature of the offending implement could not be determined in this study but stabbing alone was the most prevalent injury documented in 55 (89.5%) cases, implying the use of some penetrating type of implement. In sharp force injuries, wound examination and characterization are important. Inferences from the wound examination may be drawn concerning the nature and size of the instrument causing the injury or death, the force used to inflict the injury, the time of injury and whether the victim attempted to defend himself/herself. Patterns along the wound edge will reflect patterns on the implement such as serrated edges on knives. The direction of thrust and type of tissue penetrated should also be evaluated as these may give some indication of the position of the assailant and the amount of physical force. In this study, detailed characterization of the wounds was inadequate with only superficial descriptions of size and orientation. Therefore, an objective wound evaluation system may need to be established to ensure accuracy and consistency.

In this study, stab wounds were the cause of death in 89.5%, with shock due to exsanguination accounting for 79% of the mechanism of death. The chest is reportedly the most frequently stabbed area (15), and in this study, it was injured in 31 (54.4%) cases, being the sole area injured in 24 (42.1%) cases. The majority of the victims had injuries to the heart alone ( $n = 8$ ; 33.3%). In general, stab wounds to the heart are often transfixing or through and through injuries with wounds to the right ventricle being more dangerous than those to the left ventricle. This is because of the absence of the "muscular self-sealing" effect on the right. In this study, we were unable to determine the specific location of the cardiac injuries. As a general rule, penetrating injuries to the lungs are also common with chest injuries, usually from stabbing by knives. The wounds may end in the lung parenchyma or in a large vessel or may be through and through injuries that emerge to cause further damage to the heart or great vessels (11, 13, 15).

Penetrating abdominal wounds are not very common (13, 15), as was evident in this study, with only seven cases documented. The bias in this autopsy series may also explain the low prevalence as abdominal injuries are often less fatal than chest injuries. Nevertheless, the liver and spleen especially may bleed extensively, causing haemoperitoneum and consequent fatality (13). The intestines and mesentery are the other major targets with wounds often being multiple because of the overlapping nature of the coils and mesentery (13). The kidneys are rarely stabbed except from a thrust in the back (11). The stomach is less commonly involved in abdominal injuries, but is not uncommonly involved in chest stabbings that pass downward through the diaphragm (11, 13). Determination of the "survival period after wounding" poses more of a challenge than determining cause of death, as a variety of factors need to be taken into consideration. These factors include not only those related to the victim, but also include factors related to the environment (13, 15). In this study, the survival time post hospital admission could only be commented on and most patients died from exsanguination within 24 hours. Degiannis *et al*, however, have suggested that diagnostic acumen and rapid surgical intervention would improve survival in patients who arrive alive at hospital (14). However, in a large population-based study by Rhee *et al*, the outcome was more dismal (16).

The study was limited by failure to locate all PAD postmortem reports for the entire period selected. Despite this, overlapping confidence intervals for the two periods affirmed that there was no significant difference between them. Other limitations included inadequate routine documentation of parameters related to the injuries, both from the clinical evaluation as well as from the autopsy. Documentation of antecedent events, proposed motives, implements utilized and wound characteristics were all deficient. This may be related to inexperience and inadequate training in forensic medicine and pathology. The institution of structured protocols may well be required to ensure that these pertinent information critical to the elucidation of the case are consistently documented. As has been shown with synoptic checklist type reporting in cancer (17, 18), standardized reports would formalize the documentation, even for non-specialist clinicians and pathologists. Consequently, in 2005, the National Association of Medical Examiners (NAME) created the "forensic autopsy procedure standards" (amended 2010) aimed at providing a constructive framework that defines the fundamental services rendered by a professional forensic pathologist practising his or her art (19). Even with practical limitations in our setting, these standards could be adopted as a type of synoptic checklist for non-specialist pathologists.

In this study, young males were at greatest risk of sustaining fatal sharp force injuries. Stabbing was the most common type of injury, mainly involving the chest with injury to the heart. Most patients died from exsanguination

within 24 hours of admission. Documentation of clinical and autopsy findings were deficient. Coroner's autopsies are important in the elucidation of the epidemiology of violent and unnatural deaths and therefore the introduction of synoptic-type reports for both clinical and autopsy examination may improve complete documentation of findings, even for non-specialists.

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