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Epidemiological and Clinical Profile of War-Injured Patients Evacuated at the 1st Joint Military Hospital, Cameroon

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Abstract

Background: Armed conflict in Cameroon has generated a substantial burden of traumatic injuries requiring organized evacuation and advanced surgical care. Epidemiological data describing war-related injuries in the country remain limited. **Objective:** To describe the demographic characteristics, injury mechanisms, evacuation modalities, management, and outcomes of war-injured patients treated at a tertiary military hospital in Cameroon. **Methods:** A retrospective descriptive study was conducted from January 2022 to December 2023 at the 1st Joint Military Hospital, Yaoundé. All patients admitted for war-related injuries were included (N = 226). Variables analysed included demographics, geographic origin, injury mechanism, anatomical distribution, evacuation modality, injury-to-care delay, surgical management, ICU admission, length of stay, and in-hospital mortality. **Results:** Patients were predominantly male (92.5%) with a mean age of 28 ± 7 years. Military personnel accounted for 81.4%, while 18.6% were civilians, including women and children. Casualties originated mainly from the Far North (38.9%), North-West (24.3%), and South-West (19.0%) regions. Ballistic trauma predominated (63.7%), followed by explosions (24.8%) and sharp weapons (11.5%). Injuries mainly involved extremities (46.0%), thorax (21.2%), and abdomen (17.7%), with 29.6% presenting polytrauma. Helicopter evacuation occurred in 57.5% of cases; mean injury-to-care delay was 6 ± 3 hours. Emergency surgery was required in 61.9%, ICU admission in 22.4%, mean hospital stay was 21 days, and mortality was 17.3%. **Conclusion:** War injuries in Cameroon predomi-

nantly affect young male military personnel and are largely ballistic in nature. Despite organized evacuation systems, mortality remains substantial, highlighting the need to strengthen trauma systems and critical care capacity.

Keywords

War Injuries, Ballistic Trauma, Military Hospital, Cameroon, Polytrauma, Critical Care

1. Introduction

Armed conflict is a major contributor to trauma-related morbidity and mortality worldwide, particularly in low- and middle-income countries where health systems often operate under resource constraints. According to recent global trauma reviews, injuries from firearms and explosive devices account for a significant proportion of conflict-related deaths and disability-adjusted life years [1].

In sub-Saharan Africa, conflict-related trauma remains a persistent challenge. Civilian populations are frequently affected, and the burden of injury often overwhelms already fragile health systems. A systematic review of civilian injuries in armed conflicts published within the last decade reported that extremity injuries account for approximately 50% of all war-related trauma, with firearm injuries being the predominant mechanism [2]. The review also highlighted the limited availability of structured trauma registries across African conflict settings.

Cameroon has experienced prolonged armed violence in the Northwest and Southwest regions (Anglophone crisis) and terrorist insurgency in the Far North. These conflicts have led to displacement, infrastructure destruction, and disruption of healthcare delivery [3]. Despite ongoing violence, epidemiological data on war-related trauma within Cameroon remain sparse.

Regional studies provide useful comparisons. In the Eastern Democratic Republic of Congo (DRC), during the M23 conflict, 82% of war casualties were male, firearm injuries predominated, and in-hospital mortality was approximately 4.4% [4]. In Niger, during Boko Haram insurgency, firearm injuries accounted for 85% of cases, with mortality reported at approximately 5% [5]. Nigerian military studies documented mortality between 4% and 12% depending on injury severity and available surgical resources [6]. In Mali, firearm injuries represented nearly 80% of conflict-related trauma admissions [7].

Within Cameroon, Metogo *et al.* at Douala General Hospital reported significant trauma burden and highlighted challenges in surgical management, infection control, and delayed presentation in emergency settings [8]. However, no published study has specifically characterized war-injured patients managed in a military referral hospital in Cameroon [9].

Understanding the epidemiological and clinical characteristics of war casualties is essential for trauma system planning, resource allocation, and mortality reduction strategies.

This study aimed to describe the profile of war-injured patients evacuated from the Military Hospital Yaoundé and to compare outcomes with other African and global settings.

2. Methods

2.1. Study Design and Setting

This retrospective descriptive study was conducted at the Military Hospital Yaoundé, a tertiary military referral hospital receiving casualties from active conflict zones in Cameroon.

The hospital includes emergency, surgical, and intensive care services capable of managing severe trauma cases. Patients are evacuated via helicopter or ground ambulance.

2.2. Study Population

We included all patients admitted for war-related injuries between January 2022 and December 2023 (two-year period). War-related injury was defined as trauma sustained in the context of armed conflict, including firearm, explosive, or sharp weapon injuries.

2.3. Inclusion Criteria

- Confirmed war-related mechanism
- Admission during the study period
- Available hospital record with documented outcome

2.4. Exclusion Criteria

- Non-combat trauma
- Dead-on-arrival cases without hospital management
- Duplicate records

2.5. Data Collection

Medical records were reviewed to extract:

- Age and sex
- Military or civilian status
- Mechanism of injury
- Anatomical injury site
- Presence of polytrauma
- Surgical interventions
- Length of hospital stay
- In-hospital mortality

2.6. Operational Definitions

Polytrauma: Injuries involving two or more anatomical regions requiring surgical or intensive care management.

Injury-to-care time: Interval between documented time of injury and arrival at the emergency department.

2.7. Missing Data Management

All 226 records contained complete data for primary outcome variables (mechanism, injury site, ICU admission, and outcome). No cases were excluded due to missing mortality data. No imputation was performed.

2.8. Statistical Analysis

Data were entered into Microsoft Excel and analysed descriptively. Means and standard deviations were calculated for continuous variables; categorical variables were expressed as frequencies and percentages.

For comparative analysis, proportions observed in this study were contrasted with published African and global studies using percentage differences and relative comparisons. While formal hypothesis testing was not conducted due to the descriptive design, comparisons highlight epidemiological trends and outcome variation.

3. Results

3.1. Demographic Characteristics

A total of 226 patients were included. The mean age was 28 ± 7 years (range 15–52). Patients aged 18–35 represented 64% of cases.

Males accounted for 92.5% (n = 209). Military personnel represented 81.4% (n = 184), and civilians 18.6% (n = 42) (Table 1).

Table 1. Demographic characteristics.

Characteristic	Value
Mean age	28 ± 7 years
Male sex	92.5%
Age 18-35 years	64%
Sex ratio (M/F)	12:3:1
Military personnel	81.4%
Civilians	18.6%

3.2. Mechanism of Injury

Firearms were responsible for 63.7% (n = 144) of injuries. Explosive injuries accounted for 24.8% (n = 56). Sharp weapons accounted for 11.5% (n = 26) (Figure 1).

3.3. Anatomical Distribution

Extremities were most affected (46.0%). Thoracic injuries represented 21.2%, ab-

dominal injuries 17.7%, and polytrauma 29.6% (Table 2).

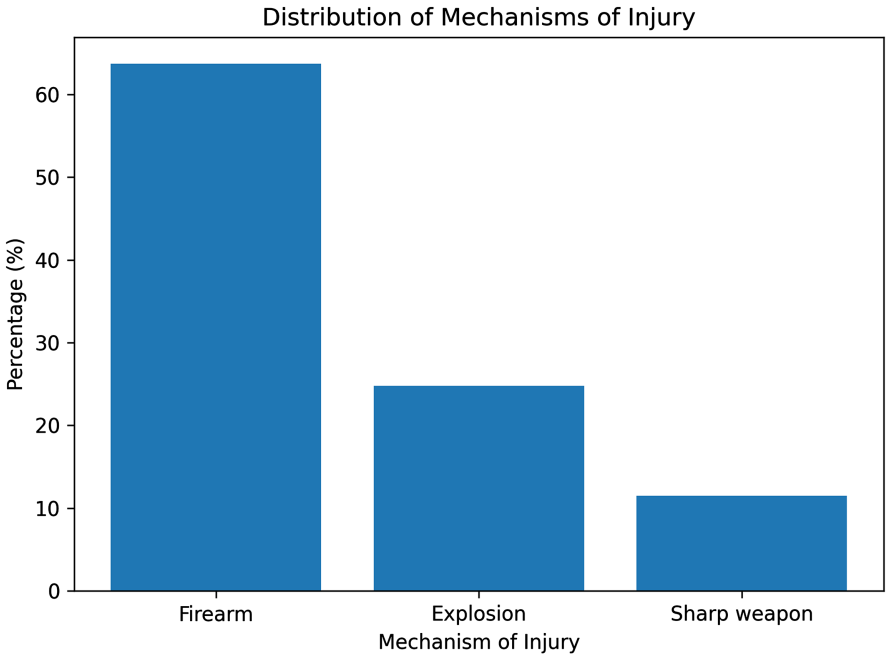

Figure 1. Distribution of mechanisms of injury.

Table 2. Anatomical distribution of injuries.

Characteristic	N = 226	Percentage (%)
Extremity injuries	104	46.0
Thoracic injuries	48	21.2
Abdominal injuries	40	17.7
Polytrauma	67	29.6

3.4. Surgical Management

Emergency surgical management was required in 61.9% (n = 140) of patients. Procedures included:

- Wound debridement and delayed primary closure (46.4%)
- Exploratory laparotomy for intra-abdominal haemorrhage or visceral injury (21.4%)
- Tube thoracostomy for hemothorax or pneumothorax (14.3%)
- Limb amputation for non-salvageable extremity trauma (17.9%)

In selected cases, staged surgical management following damage-control principles was performed in hemodynamically unstable patients (Table 3).

3.5. ICU Admission Criteria

ICU admission was based on:

- Hemodynamic instability requiring vasopressors

- Mechanical ventilation
- Severe traumatic brain injury
- Postoperative monitoring after major surgeries

ICU admission occurred in 22.4% (n = 51).

Table 3. Surgical management.

Intervention	N = 140	Percentage (%)
Laparotomy	30	21.4
Amputations	25	17.9
Thoracic drainage	20	14.3
Debridement	65	46.4

3.6. Evacuation and Outcomes

- Helicopter evacuation 57.5% (n = 130)
- Ground ambulance 42.5% (n = 96)
- Average injury to care time 6 ± 3 hours
- Intensive care unit admission 22.4% (n = 51)
- Mean hospital stay was 21 days

The in-hospital mortality rate was 17.3% (n = 39) (Tables 4-8).

Table 4. Mortality by evacuation mode.

Evacuation	Deaths	Mortality (%)
Helicopter	28/130	21.5
Ground ambulance	11/96	11.5

Table 5. Mortality by polytrauma.

Group	Deaths	Mortality (%)
Polytrauma	25/67	37.3
Non-polytrauma	14/159	8.8

Table 6. Mortality by torso injury.

Group	Deaths	Mortality (%)
Thoracic and/or abdominal injuries	24/88	27.3
Isolated extremity injuries	6/104	5.8

Table 7. ICU admission by polytrauma.

Group	Deaths	Mortality (%)
Polytrauma patients admitted to ICU	40/67	59.7
Non-polytrauma admitted to ICU	11/159	6.9

Table 8. Mortality by ICU status.

Group	Deaths	Mortality (%)
ICU patients	30/51	58.8
Non-ICU patients	9/175	5.1

4. Discussion

This study provides the first structured description of war-related trauma managed at a military referral hospital in Cameroon.

The predominance of young males aligns with regional and global patterns [1] [2] [4]-[7]. The high proportion of military personnel reflects referral bias inherent to a military hospital.

Ballistic trauma predominated, consistent with African conflict data [4]-[7]. Extremity injuries were most frequent, consistent with systematic reviews [2].

However, torso injury burden and polytrauma prevalence were substantial. Mortality was markedly higher among polytrauma patients (37.3%) and those with torso injuries (27.3%), confirming the strong association between multisystem injury and fatal outcomes.

Helicopter-evacuated patients demonstrated higher mortality, likely reflecting triage of more severe injuries.

Overall mortality (17.3%) exceeds several African reports (4% - 12%) [4]-[7], possibly due to:

- High polytrauma burden
- Significant torso injury
- Injury-to-care delay (6 hours)
- Limited ICU resources

Modern military systems emphasize damage-control resuscitation, rapid evacuation, and structured trauma systems to reduce preventable deaths [10]-[12]. Recent trauma system overviews further highlight the importance of registry-based quality improvement and early haemorrhage control in conflict settings [13] [14].

Strengthening aeromedical evacuation, expanding ICU capacity, and establishing a national trauma registry are essential for mortality reduction.

Limitations

- Retrospective design
- Single-center study
- Absence of formal injury severity scoring
- No long-term functional follow-up

5. Conclusions

War-injured patients evacuated to the 1st Joint Military Hospital are predominantly young male military personnel sustaining ballistic trauma. Mortality remains high, particularly among polytrauma and torso-injured patients.

Strengthening trauma systems, optimizing evacuation logistics, and expanding surgical critical care capacity are critical priorities in conflict-affected regions of Cameroon.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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