

Original Research Article

Epidemiological Profile and Determinants of Acute Pain in the Emergency Department of Essos Hospital Center, Yaoundé, Cameroon

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Abstract: Background: Acute pain is a leading cause of presentation to emergency departments (EDs) worldwide, yet robust data from sub-Saharan Africa remain limited. Understanding its epidemiology is essential to optimise triage, analgesic strategies, and patient outcomes. **Objective:** To characterise the epidemiological profile of acute pain and identify independent determinants of severe pain among patients presenting to the ED of Essos Hospital Center. **Methods:** We conducted a prospective observational study over three months. Consecutive adult patients (≥ 18 years) presenting with acute pain were enrolled. Pain intensity was assessed at triage using a 10-point visual analogue scale (VAS). Etiologies were categorised as trauma-related, abdominal, obstetric/gynecological, or other medical. Multivariable logistic regression identified independent predictors of severe pain (VAS ≥ 7). **Results:** Among 220 patients (mean age 36 ± 12 years; 54% female; sex ratio 0.85), trauma-related pain accounted for 38% of presentations, abdominal 31%, obstetric/gynecological 18%, and other medical 13%. Severe pain was reported in 64% of patients. Independent predictors of severe pain were female sex (OR 1.7; 95% CI 1.1–2.7), trauma-related etiology (OR 2.3; 95% CI 1.4–3.8), and delayed presentation > 2 hours (OR 1.9; 95% CI 1.2–3.1). **Conclusion:** Trauma, abdominal, and obstetric/gynecological conditions are the predominant causes of acute pain. Early, structured, context-adapted analgesia protocols are essential to reduce oligoanalgesia and improve emergency care quality in resource-limited settings.

Keywords: Acute Pain, Emergency Department, Epidemiology, Cameroon, Trauma, Obstetric Pain.

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INTRODUCTION

Acute pain is one of the most common reasons for presentation to the emergency department (ED) and remains a key determinant of both patient experience and quality of care. Despite advances in clinical practice and the increasing recognition of pain as a vital sign, its timely and effective management remains suboptimal worldwide. Oligoanalgesia, defined as delayed, inadequate, or absent analgesic treatment, continues to be widely reported, particularly in resource-constrained healthcare settings [1]. In low- and middle-income countries (LMICs), multiple structural and organisational factors contribute to these shortcomings, including limited resources, high patient volumes, and variability in clinical practice. In sub-Saharan Africa, the scarcity of robust epidemiological data on acute pain further compounds these challenges, limiting the development and implementation of context-adapted

pain management strategies [2]. A comprehensive understanding of the distribution of acute pain etiologies, together with identification of factors associated with severe pain, is essential to inform triage prioritisation, facilitate early and appropriate analgesic interventions, and optimise the allocation of scarce healthcare resources. Acute abdominal pain, for instance, represents a major driver of ED utilisation, highlighting the importance of context-specific epidemiological data [3]. Recent evidence has also underscored the complexity of acute pain management, including the variable effectiveness of opioid-based strategies and the increasing emphasis on multimodal, patient-centred approaches tailored to both clinical context and resource availability [4, 5]. In this context, the present study aimed to characterise the epidemiological profile of acute pain among patients presenting to the ED of Essos Hospital Center and to identify independent determinants of severe pain.

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PATIENTS AND METHODS

Study Design and Setting

We conducted a prospective observational study in the emergency department (ED) of Essos Hospital, a tertiary referral center in Yaoundé, Cameroon, over a three-month period from December 2025 to February 2026. The ED provides 24-hour care and serves a heterogeneous urban population.

Participants

All consecutive adult patients (≥ 18 years) presenting with acute pain were eligible for inclusion. Acute pain was defined as pain of recent onset or a sudden exacerbation requiring urgent medical evaluation. Patients with chronic pain managed under established treatment protocols, as well as those unable to provide a reliable assessment of pain intensity (e.g., altered mental status or communication barriers), were excluded.

Data Collection

Data were collected prospectively using a standardised case report form by trained clinicians. Variables included demographic characteristics (age, sex), anthropometric data (body-mass index [BMI]), comorbidities, prior surgical history, and time from symptom onset to ED presentation. Pain intensity was assessed at triage using a 10-point visual analogue scale (VAS). Pain etiologies were categorised a priori into four groups: trauma-related (including road traffic injuries, falls, and interpersonal violence), abdominal (gastrointestinal and urological causes), obstetric/gynecological (including labour, miscarriage, and pelvic pain), and other medical causes (including cardiovascular, neurological, and musculoskeletal conditions).

Outcomes

The primary outcome was the distribution of acute pain aetiologies. Secondary outcomes included the prevalence of severe pain, defined as $VAS \geq 7$, and the identification of independent determinants of severe pain.

Statistical Analysis

Categorical variables are presented as frequencies and percentages, and continuous variables as mean \pm standard deviation (SD) or median with interquartile range (IQR), as appropriate. Group comparisons were performed using the chi-square test or Student's t-test, depending on data distribution. Multivariable logistic regression analysis was conducted to identify independent predictors of severe pain. Variables with clinical relevance or a p value < 0.20 in univariable analysis were entered into the multivariable model. Results are reported as odds ratios (ORs) with 95% confidence intervals (CIs). A two-sided p value < 0.05 was considered statistically significant. Statistical analyses were performed using SPSS software, version 26 (IBM Corp., Armonk, NY, USA).

RESULTS

Population Characteristics

A total of 220 adult patients were included in the study. The mean age was 36 ± 12 years (range 18–75), with a slight female predominance ($n = 119$, 54%; sex ratio M/F = 0.85). The mean body mass index (BMI) was 24.5 ± 4.2 kg/m². Comorbidities were present in a minority of patients: hypertension (14%) and diabetes mellitus (7%). Prior surgical history included abdominal surgery in 20% and orthopaedic surgery in 12% of cases. The population characteristics were balanced across demographic and clinical variables, minimising potential selection bias (Table 1).

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	n (%) or mean \pm SD
Total patients	220
Age (years)	36 ± 12
Female sex	119 (54%)
Sex ratio	0.85
BMI (kg/m ²)	24.5 ± 4.2
Hypertension	31 (14%)
Diabetes mellitus	15 (7%)
Prior abdominal surgery	44 (20%)
Prior orthopaedic surgery	26 (12%)

Distribution of Pain Etiologies

Trauma-related conditions were the most frequent, accounting for 38% of all presentations ($n = 84$). Road traffic injuries predominated ($n = 46$; 21% of all patients; 55% of trauma cases), followed by domestic accidents ($n = 10$; 5%; 12%), sports injuries ($n = 10$; 5%; 12%), interpersonal violence ($n = 6$; 3%; 7%), and other traumatic causes ($n = 12$; 5%; 14%).

Abdominal pain represented 31% of cases ($n = 68$), mainly due to acute appendicitis ($n = 18$; 8%; 26% of abdominal cases), peritonitis ($n = 14$; 6%; 21%), acute cholecystitis ($n = 12$; 5%; 18%), urinary tract obstruction or renal colic ($n = 10$; 5%; 15%), and other abdominal conditions ($n = 14$; 6%; 20%).

Obstetric and gynecological pain accounted for 18% ($n = 40$), largely driven by labour-related pain ($n =$

22; 10%; 55% of obstetric/gynecological cases), miscarriage or threatened abortion (n = 10; 5%; 25%), and pelvic inflammatory disease or other gynecological pain (n = 8; 4%; 20%).

Other medical causes represented 13% of presentations (n = 28), including chest pain (n = 8; 4%; 29% of other medical cases), non-traumatic musculoskeletal pain (n = 10; 5%; 36%), headache (n = 6; 3%; 21%), and miscellaneous medical causes (n = 4; 2%; 14%).

Table 2: Distribution of Pain Etiologies

Major Category	Specific Etiology	Number (n)	% of Total (n=220)	% Within Category
Trauma-related	Road traffic injuries	46	21	55
	Domestic accidents	10	5	12
	Interpersonal violence	6	3	7
	Sports injuries	10	5	12
	Other traumatic causes*	12	5	14
Subtotal Trauma	-	84	38	100
Abdominal	Acute appendicitis	18	8	26
	Peritonitis	14	6	21
	Acute cholecystitis	12	5	18
	Urinary tract obstruction / renal colic	10	5	15
	Other abdominal causes**	14	6	20
Subtotal Abdominal	-	68	31	100
Obstetric/Gynaecological	Labour pain	22	10	55
	Miscarriage / threatened abortion	10	5	25
	Pelvic inflammatory disease / other gynaecological pain	8	4	20
Subtotal Obstetric/Gynecological	-	40	18	100
Other medical	Chest pain	8	4	29
	Musculoskeletal (non-traumatic)	10	5	36
	Headache	6	3	21
	Other medical causes***	4	2	14
Subtotal Other medical*	-	28	13	100
Total	-	220	100	-

*Other traumatic causes: burns, atypical minor injuries.

**Other abdominal causes: severe gastroenteritis, other less common acute abdominal syndromes.

***Other medical causes: vaso-occlusive crises, atypical thoracic pain unrelated to cardiac causes.

Pain Severity by Etiology

Severe pain (VAS ≥7) was reported in 141 patients (64%), with a median triage VAS of 7 [IQR 6–9]. Pain intensity was highest among trauma patients (median VAS 8 [7–9]; 72 patients, 86%; 95% CI 77–93),

followed by abdominal pain (median VAS 7 [6–8]; 46 patients, 68%; 95% CI 56–78), obstetric/gynecological pain (median VAS 6 [5–8]; 18 patients, 45%; 95% CI 30–61), and other medical causes (median VAS 6 [5–7]; 5 patients, 18%; 95% CI 6–36).

Table 3: Pain Severity by Etiology

Etiology	Median VAS [IQR]	Severe Pain (VAS ≥7) n (%)	95% CI
Trauma-related	8 [7-9]	72 (86)	77-93
Abdominal	7 [6-8]	46 (68)	56-78
Obstetric/Gynecological	6 [5-8]	18 (45)	30-61
Other medical	6 [5-7]	5 (18)	6-36
Total	7 [6-9]	141 (64)	57-70

Determinants of Severe Pain

Multivariable logistic regression identified female sex, trauma-related aetiology, and delayed

presentation (>2 hours) as independent predictors of severe pain. Age, BMI, and comorbidities were not significantly associated.

Table 4: Multivariable Analysis of Determinants of Severe Pain (VAS ≥7)

Variable	OR	95% CI	p-value
Female sex	1.7	1.1-2.7	0.02
Trauma-related pain	2.3	1.4-3.8	<0.001
Delay >2 hours	1.9	1.2-3.1	0.01
Age	NS	-	>0.05
BMI	NS	-	>0.05
Comorbidities	NS	-	>0.05

Time to ED Presentation by Pain Etiology

The median delay from symptom onset to ED presentation was 90 minutes [IQR 45–150]. Patients with trauma-related pain presented earlier (median 60 [30–120] minutes) than those with abdominal (120 [60–180] minutes), obstetric/gynecological (100 [50–160]

minutes), or other medical causes (110 [60–200] minutes). The range of presentation times was widest for abdominal pain (20–480 minutes), reflecting heterogeneity in symptom recognition and care-seeking behaviour.

Table 5: Median Time to ED Presentation by Etiology

Etiology	Median delay [IQR], minutes	Range (min–max)
Trauma-related	60 [30-120]	10-360
Abdominal	120 [60-180]	20-480
Obstetric/Gynecological	100 [50-160]	30-360
Other medical	110 [60-200]	25-420
Total	90 [45-150]	10-480

DISCUSSION

In this prospective observational study conducted in the emergency department of Essos Hospital Center, we provide one of the most comprehensive characterisations to date of the epidemiology and determinants of acute pain within a sub-Saharan African emergency care setting. Presentations for acute pain encompassed a wide spectrum of pathologies, with trauma-related conditions accounting for the largest proportion (38%), followed by abdominal pain (31%), obstetric and gynecological conditions (18%), and other medical causes (13%). Severe pain, defined as a visual analogue scale score ≥7, was highly prevalent, affecting 64% of patients, particularly those with trauma-related etiologies. Multivariable analysis identified female sex, trauma etiology, and delayed presentation to the emergency department as independent predictors of severe pain. These findings underscore enduring gaps in the timely recognition and management of acute pain in resource-constrained emergency settings and are consistent with emerging global evidence highlighting the persistence of oligoanalgesia and the multifactorial determinants of pain severity in acute care contexts.

Our findings are consistent with the literature documenting the substantial burden of acute pain in trauma and surgical emergencies globally [6-8]. Worku et al., recently highlighted that acute pain in trauma patients is highly prevalent and influenced both by the nature of the injury and by deficiencies in pain assessment and management, reinforcing the persistent under-recognition of pain in emergency care systems [6]. Similarly, systematic reviews of abdominal surgical emergencies in sub-Saharan Africa indicate that

appendicitis, peritonitis, intestinal obstruction, and abdominal trauma constitute the most frequent causes of acute surgical pain, contributing significantly to morbidity and severe pain reporting in emergency departments [7, 8]. These data contextualise our observation that abdominal Etiologies accounted for nearly one-third of acute pain presentations.

The predominance of trauma-related pain in our cohort reflects broader epidemiological patterns in low- and middle-income countries (LMICs), where road traffic injuries and interpersonal violence are major public health burdens [9, 10]. Rapid urbanisation, limited enforcement of road safety regulations, and gaps in prehospital care contribute to high trauma incidence in sub-Saharan Africa, resulting in elevated rates of acute and often severe pain in EDs. Our findings are in keeping with data from both prehospital and hospital settings that identify trauma as a principal driver of severe acute pain [11].

Abdominal and obstetric/gynecological pain were also highly represented, reflecting regional patterns in emergency care. Acute abdominal pain is a frequent ED presentation worldwide, with high diagnostic complexity and risk of adverse outcomes if managed suboptimally [12]. In the African context, appendicitis and peritonitis alone comprise a substantial fraction of abdominal emergencies requiring urgent evaluation [7, 8]. Obstetric and gynecological pain, largely related to labour and early pregnancy complications, poses diagnostic and analgesic challenges, particularly where obstetric anesthesia resources are limited.

The overall prevalence of severe pain (64%) in our study underscores the ongoing inadequacy of early pain control in EDs. Globally, moderate to severe pain affects 40-90% of adult ED presentations, particularly where pain assessment tools are inconsistently used or analgesic protocols are absent [13-15]. Our multivariable analysis confirms that trauma-related pain is an independent determinant of severe pain, reflecting both the nociceptive burden of traumatic injuries and deficiencies in rapid analgesic delivery in resource-constrained settings. Female sex also emerged as an independent predictor, consistent with evidence that biological, psychological, and sociocultural factors influence pain perception and reporting, though mechanisms remain complex and multifactorial [16].

Delayed presentation to the ED (>2 hours from symptom onset) was another significant predictor of severe pain, likely reflecting both barriers to healthcare access and the progression or intensification of pain over time. In LMICs, delays are often driven by financial constraints, transportation challenges, and limited awareness of urgency, all of which prolong periods of unmanaged pain prior to ED arrival. Similar associations between delayed presentation and heightened pain severity have been documented in emergency care studies across diverse settings [17].

Our findings have clear implications for emergency pain management. Despite evidence that early, systematic pain assessment improves pain control and patient satisfaction, many EDs in LMICs lack standardised assessment protocols and nurse-initiated analgesia pathways [18]. Recent studies demonstrate that structured pain pathways with triage nurse involvement significantly reduce time to analgesia and improve pain outcomes, even in high-volume EDs [19]. Implementing such strategies in resource-limited settings could bridge critical gaps in early pain relief, particularly for trauma and acute surgical conditions.

Context-adapted analgesia strategies are essential, given that many African EDs experience inconsistent or inadequate pain management due to limited analgesic availability, insufficient training, and weak prehospital care systems [11-20]. Scoping reviews of prehospital and ED pain management in sub-Saharan Africa underscore broad deficiencies in pain assessment and analgesic delivery, highlighting the need for system-wide interventions and policy improvements [20]. Another consideration is the interplay between pain severity and diagnostic complexity. Severe pain often coincides with conditions requiring urgent surgical evaluation, such as appendicitis or peritonitis, which contribute both to pain intensity and to resource allocation challenges. Effective emergency care therefore necessitates integrated approaches addressing both prompt analgesia and timely diagnosis.

Study Limitation

Several limitations merit acknowledgement. As a single-centre study at a tertiary referral ED, our findings may not be fully generalisable to all emergency settings in Cameroon or other sub-Saharan African countries. Unmeasured confounders, including socioeconomic status and prehospital analgesia use, may influence pain severity and healthcare-seeking behaviour. Nevertheless, the prospective design, systematic pain assessment using validated tools, and multivariable analysis strengthen the validity and relevance of our conclusions.

CONCLUSION

This prospective study conducted in the emergency department of Essos Hospital offers a comprehensive characterisation of the epidemiology and determinants of acute pain in a sub-Saharan African context. Trauma-related, abdominal, and obstetric/gynecological pain constituted the majority of presentations, accounting for 38%, 31%, and 18% of cases, respectively. Within trauma-related presentations, road traffic accidents and interpersonal violence were the predominant causes, while abdominal pain was chiefly due to acute surgical conditions such as appendicitis and peritonitis. Obstetric and gynecological pain was largely associated with labour or pregnancy-related complications. Severe pain (VAS ≥ 7) was highly prevalent, affecting 64% of patients, with independent predictors including female sex, trauma-related etiology, and presentation delays exceeding two hours. These findings underscore ongoing deficiencies in early pain recognition and management, highlighting the need to prioritise high-risk patient groups for timely assessment and analgesic intervention. Collectively, our results advocate for the implementation of structured, context-specific analgesia protocols that incorporate systematic pain assessment and rapid intervention. Such strategies are likely to mitigate oligoanalgesia, optimise patient outcomes, and enhance the overall quality of emergency care in resource-constrained settings.

Conflict of Interest: The authors declare that they have no conflicts of interest relevant to this study.

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