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SPECTRUM AND OUTCOMES OF ORTHOPEDIC CONDITIONS PRESENTING THROUGH EMERGENCY SERVICES DURING NIGHT-TIME HOURS: A RETROSPECTIVE DESCRIPTIVE STUDY

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ABSTRACT

Background: Night-time emergency orthopaedic presentations constitute a significant but undercharacterised proportion of emergency department (ED) workload in tertiary care hospitals in India. Understanding the spectrum, severity, and outcomes of orthopaedic conditions presenting during nocturnal hours is essential for optimising staffing, resource allocation, surgical scheduling, and training protocols in emergency orthopaedic services.

Objectives: To describe the spectrum of orthopaedic conditions, clinical characteristics, severity, management patterns, and in-hospital outcomes of patients presenting to the emergency department through emergency services during night-time hours (8:00 PM to 8:00 AM) at Career Institute of Medical Sciences and Hospital (CIMS&H), Lucknow, Uttar Pradesh, from December 2017 to September 2018.

Methodology:A retrospective descriptive study of all orthopaedic patients presenting via emergency services during night-time hours (8 PM to 8 AM) at CIMS&H between December 2017 and September 2018 was conducted. Medical records were reviewed for demographics, mechanism of injury, diagnosis, anatomical site, injury severity, clinical management (conservative versus operative), operative details, and in-hospital outcomes. Data were entered in Microsoft Excel and analysed using SPSS v21.

Results:A total of 486 night-time orthopaedic emergency presentations were recorded over ten months. The majority were male (72.4%) with a mean age of 36.8 ± 17.6 years. Road traffic accidents (RTAs) were the dominant mechanism of injury (58.2%), followed by fall from height (18.5%), domestic falls (12.1%), assault (5.8%), and sports injuries (3.1%). Lower limb fractures (femur, tibia-fibula, ankle) constituted 44.8% of all injuries; upper limb fractures accounted for 22.6%; open fractures (compound) constituted 19.8% of all presentations. Emergency operative intervention within the same night was required in 21.8% of patients; 54.3% underwent surgery within 24 hours of presentation. Complications during the index admission included surgical site infection (SSI) in 8.6%, compartment syndrome in 3.7%, and vascular injury requiring urgent repair in 2.1%. In-hospital mortality was 3.1% (n=15), with traumatic brain injury (TBI) as the commonest cause of death.

Conclusion: Night-time orthopaedic emergency presentations at CIMS&H, Lucknow, are predominantly male, young, RTA-related, and involve a high proportion of open fractures requiring urgent operative intervention. The high proportion of open fractures, requirement for nocturnal surgery, and associated complications underscore the need for dedicated orthopaedic emergency teams, round-the-clock operation theatre access, and structured protocols for after-hours management of orthopaedic emergencies at tertiary care institutions in Uttar Pradesh.

Keywords: night-time orthopaedic emergencies, road traffic accident, open fractures, nocturnal surgery, emergency department, Lucknow, Uttar Pradesh, India

1. INTRODUCTION

Emergency orthopaedic presentations constitute a major component of the emergency department (ED) workload at tertiary care hospitals in India. Musculoskeletal injuries from road traffic accidents (RTAs), falls, and occupational trauma account for a substantial proportion of all trauma-related morbidity and mortality in low- and middle-income countries (LMICs), with India bearing one of the highest absolute burdens of orthopaedic trauma globally [1,2]. A multicentre Indian study demonstrated that among 4,822 musculoskeletal trauma patients, 68% were male with a mean age of 40.9 years, and road traffic accidents accounted for 51.8% of all trauma mechanisms — patterns closely mirrored in emergency orthopaedic cohorts across the country [3]. In Uttar Pradesh, which has one of the highest rates of road traffic fatalities in India, the emergency orthopaedic burden at tertiary institutions is particularly severe [4].

The temporal distribution of emergency orthopaedic presentations is a well-recognised but understudied phenomenon in the Indian context. Studies from western healthcare systems have documented that trauma admissions are more frequent on weekends and during evening and night hours (6 PM to 6 AM), with peak arrival times centred around the evening and nocturnal periods driven primarily by RTA patterns, alcohol-related trauma, and occupational accidents [5,6]. Night-time orthopaedic emergencies present unique clinical challenges: they require urgent assessment by potentially fatigued surgical teams, resource-limited after-hours operating environments, and decision-making under conditions of reduced ancillary support [7,8]. Several studies have demonstrated that night-time orthopaedic trauma surgery is associated with higher in-hospital complication rates (OR 1.51, $p=0.021$) and mortality (OR 1.26, $p=0.04$) compared to morning surgery, largely due to the emergency nature of nocturnal cases and surgeon fatigue [9].

Lower limb fractures, particularly of the femur, tibia-fibula complex, and ankle, constitute the largest anatomical category in orthopaedic trauma registries globally and in India [10]. Open (compound) fractures, classified by the Gustilo-Anderson system, represent the most complex subset requiring urgent debridement, antibiotic prophylaxis, and staged reconstruction, and are disproportionately represented in nocturnal high-energy RTA presentations [11,25]. In India, where two-wheeled vehicle use is dominant and helmet and protective equipment compliance remain suboptimal, open fractures of the tibia are especially prevalent in night-time trauma presentations from road traffic mechanisms [12,14].

Career Institute of Medical Sciences and Hospital (CIMS&H), IIM Road, Ghaila, Lucknow, is a tertiary-level teaching hospital serving central and eastern Uttar Pradesh and receiving a high volume of orthopaedic emergency referrals, including complex high-energy trauma from nocturnal RTAs. Despite the considerable night-time orthopaedic burden at this institution, no published study has characterised the spectrum, severity, management patterns, and outcomes of nocturnal orthopaedic emergency presentations from CIMS&H or from the broader Lucknow tertiary care setting. The present retrospective descriptive study was designed to address this gap, providing data to inform staffing, resource allocation, and quality improvement initiatives in emergency orthopaedic care at this institution.

2. REVIEW OF LITERATURE

The literature on emergency orthopaedic presentations, particularly nocturnal patterns and their outcomes, spans epidemiological studies, temporal analysis of trauma admissions, and outcome studies examining the effect of surgery time on complication rates.

On the global burden of musculoskeletal trauma: Haagsma et al. (2016) from the Global Burden of Disease Study 2013 quantified the global burden of injury, demonstrating that musculoskeletal injuries contributed 24.9% of all years lived with disability (YLDs) globally, with LMICs accounting for a disproportionate share, particularly from RTA-related long bone fractures [1]. Meena et al. (2014) from AIIMS Jodhpur, in a study of 3,000 consecutive indoor orthopaedic patients, documented that lower limb fractures were most prevalent (56.3%), road traffic accidents accounted for 46% of fractures, and the population affected was younger (mean age 32.6 years) than in western cohorts [13]. Roy et al. (2014) in a cross-sectional study from a northern India major trauma centre documented that injuries occurred predominantly in the 15–30 year age group (male:female ratio 6:1), two-wheeler accidents were the most common mechanism, and compound lower limb fractures were significantly more common than upper limb compound fractures [13].

Regarding temporal patterns of trauma admissions: Ciesla et al. (2016) in a cross-sectional study of 10,684 trauma contacts at a US Level 1 trauma centre over three years found that peak trauma arrival times centred around 6–7 PM, trauma contacts were significantly more frequent on weekends ($p<0.001$), and penetrating injuries peaked later into the night than blunt injuries [5]. Garg et al. (2014) in a study of road traffic accident cases at a tertiary Indian hospital documented that most RTA cases occurred between 6 PM and 10 PM, with monsoon months accounting for the highest frequency of accidents and two-wheeled vehicle users incurring the highest rates of severe lower limb fractures [14]. Ruikar (2013) analysed national statistics of road traffic accidents in India and documented that more than 50% of RTAs occur between 6 PM and 9 AM, confirming the nocturnal predominance of RTA-related orthopaedic trauma that drives night-time emergency orthopaedic workload [4].

On the effect of night-time surgery on orthopaedic outcomes: Franke et al. (2019) in a retrospective analysis of 31,692 orthopaedic trauma patients from a Swiss national surgical quality database found that mortality was significantly higher after night-time surgery (2.4%, OR 1.26, $p=0.04$) compared to morning surgery (1.1%), and complication rates were significantly elevated with nocturnal procedures (OR 1.51, $p=0.021$). Emergency surgery and night-time operation were independent predictors of mortality, and surgeries performed at night were predominantly emergency cases managed by less experienced surgeons [9]. Switzer et al. (2013) in a case-controlled study of hip fracture surgery found no significant effect of time of day on mortality specifically for hip fracture fixation, suggesting that procedural complexity and patient selection may modify the time-of-day effect [15]. Rashid et al. (2013) similarly demonstrated in a case-control study that surgical timing had no significant independent effect on hip fracture mortality once patient ASA status and comorbidity were adjusted, but noted that night-time resources were less optimal [16]. A systematic review by Kelz et al. (2015) confirmed that after-hours emergency surgery was associated with significantly higher mortality across surgical specialties, with the mechanism being a combination of patient acuity (sicker patients requiring emergency surgery) and provider fatigue [17].

On open fracture management: Halawi and Morwood (2015) in a clinical review of open fractures noted that the Gustilo-Anderson classification system is the universally accepted grading framework, with Type III fractures (particularly IIIB and IIIC) associated with infection rates of 45–61% and non-union rates of up to 33% [11]. Anderson (2011) reviewed complications of open tibial shaft fractures stratified by Gustilo-Anderson grade and reported infection rates of 2.7% for Grade I, 9.8% for Grade II, 45% for Grade IIIA, and 61% for Grade IIIB, confirming the exponential increase in adverse outcomes with escalating open fracture severity [18]. Gopal et al. (2000) advocated early definitive soft tissue coverage (within 72 hours) for Grade IIIB tibial fractures and demonstrated significantly reduced infection rates and better functional outcomes with this approach compared to delayed coverage [19].

On the epidemiology of specific fracture types presenting at emergency: Court-Brown and Caesar (2006) reviewed the epidemiology of adult fractures in a large Edinburgh cohort and demonstrated that lower limb fractures constituted 56.6% of all emergency fracture presentations, with tibial shaft, ankle, and femoral fractures being the three most common; male patients predominated under age 50, while females predominated above age 65 due to osteoporotic hip fractures [10]. Nordvall et al. (2009) from Sweden documented that distal radius fractures (Colles' type) were the single most common fracture type presenting to emergency departments, with a bimodal age distribution reflecting high-energy injuries in young males and low-energy osteoporotic fractures in postmenopaedic women [20]. Parker and Johansen (2006) in a systematic review confirmed the growing burden of hip (proximal femur) fractures in the elderly, with 30-day mortality of 5–10% and one-year mortality of 15–30%, emphasising the importance of rapid operative fixation even in the nocturnal emergency setting [21]. For the Indian context specifically: Bhandari et al. (2015) from the INORMUS multicentre study of 4,822 Indian orthopaedic trauma patients documented a 30-day mortality of 4.6% and a 4.3% reoperation rate, with infection being the most common complication, confirming that Indian orthopaedic trauma outcomes closely reflect the LMIC pattern of delayed presentation, higher open fracture rates, and limited antibiotic stewardship [3]. Garg et al. (2012) from a retrospective study in a North Indian trauma centre documented that the male:female ratio in trauma presentations was 4.8:1, the 21–40 year age group was most commonly affected, and operative intervention was required in 63% of all orthopaedic admissions [22]. Singh et al. (2014) from a large retrospective analysis at AIIMS New Delhi documented that tibial shaft fractures were the most common single long bone fracture requiring emergency operation and had a high rate of SSI (11.4%) when managed with intramedullary nailing after open injury [23].

3. OBJECTIVES

Primary Objective:

To describe the spectrum of orthopaedic conditions (diagnoses, anatomical sites, severity) presenting through emergency services during night-time hours (8:00 PM to 8:00 AM) at Career Institute of Medical Sciences and Hospital (CIMS&H), Lucknow, Uttar Pradesh, from December 2017 to September 2018.

Secondary Objectives:

- To characterise the demographic profile (age, sex, residence) and mechanism of injury of night-time orthopaedic emergency presentations at CIMS&H.
- To determine the frequency distribution of anatomical sites of injury including lower limb, upper limb, spine, pelvis, and polytrauma.
- To assess the severity of open fractures using the Gustilo-Anderson classification system and correlate grade with in-hospital outcome.
- To describe the management patterns (conservative vs. operative; immediate nocturnal surgery vs. next-day surgery) and operative interventions performed.
- To determine the in-hospital outcomes including complications (surgical site infection, compartment syndrome, neurovascular injury), length of hospital stay, and in-hospital mortality.
- To identify temporal patterns within the night-time period (early night 8–12 PM vs. late night 12–8 AM) and seasonal variation in presentation volume.

4. METHODOLOGY

4.1 Study Design

Retrospective descriptive observational study.

4.2 Study Setting

The study was conducted in the Department of Orthopaedics in collaboration with the Department of Emergency Medicine at Career Institute of Medical Sciences and Hospital (CIMS&H), IIM Road, Ghaila, Lucknow, Uttar Pradesh. CIMS&H is a tertiary-level teaching hospital with a 24-hour emergency orthopaedic service, dedicated trauma operation theatre, and medical ICU. The institution serves as a major emergency orthopaedic referral centre for central and eastern Uttar Pradesh, receiving high-energy trauma patients from road traffic accidents across Lucknow and surrounding districts.

4.3 Study Period

December 2017 to September 2018 (ten months).

4.4 Definition of Night-Time Emergency

Night-time hours were defined as 8:00 PM to 8:00 AM (12-hour nocturnal window), consistent with the definition used in comparable published orthopaedic emergency and after-hours surgery outcome studies [9,24]. A night-time orthopaedic emergency was defined as any patient presenting to the CIMS&H emergency department during these hours with a primary musculoskeletal complaint (fracture, dislocation, soft tissue injury, or spinal emergency) requiring immediate orthopaedic assessment and management.

4.5 Study Population and Sample Size

The study population comprised all patients presenting to the emergency services of CIMS&H with orthopaedic conditions during night-time hours (8 PM to 8 AM) between December 2017 and September 2018. A preliminary audit of the emergency orthopaedic logbook estimated approximately 45–55 night-time orthopaedic presentations per month, yielding an expected cohort of 450–550 patients over ten months. This sample size was deemed adequate for descriptive analysis of the spectrum and outcomes of night-time orthopaedic presentations. The final enrolled cohort was 486 patients.

4.6 Sampling Method

Total enumeration. All eligible orthopaedic emergency presentations during night-time hours in the study period whose complete emergency and inpatient records were retrievable from the emergency department logbook, medical records department (MRD), and operation theatre register of CIMS&H were enrolled.

4.7 Data Collection Tool

A structured retrospective data extraction proforma was developed comprising five sections: (i) demographic and presentation data (age, sex, residence, time of arrival, mode of transport, referring facility); (ii) mechanism and severity of injury (mechanism of injury, type of injury — closed vs. open, Gustilo-Anderson grade for open fractures, presence of polytrauma, associated injuries); (iii) diagnosis and anatomical site (primary orthopaedic diagnosis, anatomical site — lower limb, upper limb, spine, pelvis, soft tissue only, multiple sites); (iv) management data (conservative vs. operative management, timing of surgery — same-night emergency vs. next-day semi-elective, type of procedure, anaesthesia type, operative duration, blood transfusion requirement); and (v) outcome data (length of hospital stay, in-hospital complications, discharge status, in-hospital mortality and cause of death). The proforma was pilot-tested on 20 records and refined prior to full data extraction.

4.8 Open Fracture Classification

Open fractures were classified using the Gustilo-Anderson system (modified 1984 criteria): Grade I (wound <1 cm, clean, minimal contamination), Grade II (wound 1–10 cm, moderate contamination, moderate soft tissue injury), Grade IIIA (wound >10 cm, high energy, adequate periosteal coverage), Grade IIIB (periosteal stripping, requiring local or free flap coverage), and Grade IIIC (arterial injury requiring repair) [25,26]. Classification was determined by the on-call orthopaedic consultant based on the operative assessment at initial debridement.

4.9 Statistical Analysis

Data were entered in Microsoft Excel 2016 and analysed using SPSS v21.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) or median (interquartile range) for skewed distributions. Categorical variables were expressed as frequency (n) and percentage (%). Chi-square test was used to assess associations between categorical variables (e.g., mechanism of injury and open fracture grade; timing of surgery and SSI rate). Trends in presentation volume across the ten-month period were assessed using descriptive time-series analysis. A two-tailed p-value <0.05 was considered statistically significant.

4.10 Ethical Clearance

Ethical approval was obtained from the Institutional Ethics Committee of Career Institute of Medical Sciences and Hospital prior to data extraction. Since this was a retrospective record-based study with no direct patient contact or intervention, individual informed consent was waived per IEC approval conditions. Patient data were anonymised prior to analysis. The study was conducted in accordance with the Declaration of Helsinki (revised 2013) and the ICMR National Ethical Guidelines for Biomedical and Health Research Involving Human Participants (2006).

5. INCLUSION AND EXCLUSION CRITERIA

5.1 Inclusion Criteria

- Patients of any age and either sex presenting to the emergency department of CIMS&H via emergency services during night-time hours (8:00 PM to 8:00 AM) between December 2017 and September 2018
- Primary orthopaedic complaint: fracture, dislocation, joint injury, soft tissue orthopaedic injury (not primarily vascular or neurological), or acute spinal emergency requiring orthopaedic assessment
- Minimum emergency department contact resulting in orthopaedic assessment and documented management plan
- Complete emergency presentation records and inpatient records (where admitted) available in the MRD of CIMS&H

5.2 Exclusion Criteria

- Patients presenting during daytime hours (8:00 AM to 8:00 PM)
- Patients referred from CIMS&H to another institution during the same night-time emergency contact (transferred before assessment completion)
- Isolated soft tissue injuries without bone or joint involvement (e.g., abrasions only, lacerations only managed by surgery without orthopaedic involvement)
- Patients who left against medical advice (LAMA) within one hour of emergency registration, precluding complete assessment documentation
- Incomplete records precluding extraction of primary diagnosis, anatomical site, and clinical management

6. RESULTS AND ANALYSIS

6.1 Demographic Profile and Mechanism of Injury

A total of 486 night-time orthopaedic emergency presentations were recorded at CIMS&H over the ten-month study period (December 2017–September 2018), yielding a mean of 48.6 presentations per month. Table 1 presents the demographic profile and mechanism of injury.

Table 1: Demographic Profile and Mechanism of Injury (n=486)

Variable	n (%)	Notes
DEMOGRAPHICS		

Variable	n (%)	Notes
Sex: Male	352 (72.4%)	M:F = 2.6:1
Age (years, mean ± SD)	36.8 ± 17.6	Range: 2–85 years
Age group: 15–44 years (peak productive age)	274 (56.4%)	
Age group: ≥65 years (elderly)	58 (11.9%)	
Residence: Urban	312 (64.2%)	
Mode of transport: Ambulance	198 (40.7%)	
MECHANISM OF INJURY		
Road traffic accident (RTA)	283 (58.2%)	Two-wheeler: 74.6% of RTAs
Fall from height (>1 metre)	90 (18.5%)	
Domestic fall (ground level)	59 (12.1%)	Elderly predominance
Assault / interpersonal violence	28 (5.8%)	
Sports / recreational injury	15 (3.1%)	
Industrial / occupational accident	11 (2.3%)	

RTA: Road traffic accident. SD: Standard deviation. Two-wheeler includes motorcycle and scooter. Domestic fall predominantly in females ≥60 years (68%).

6.2 Anatomical Distribution and Diagnosis Spectrum

Table 2 presents the anatomical distribution of orthopaedic injuries presenting during night-time hours.

Table 2: Anatomical Distribution of Night-Time Orthopaedic Emergency Presentations (n=486)

Anatomical Category / Specific Injury	n (%)	Most Common Specific Diagnosis	Open Fracture n (%)
LOWER LIMB (total)	218 (44.8%)		64 (29.4%)
Femoral shaft / subtrochanteric	52 (10.7%)	Femoral shaft (38/52)	16 (30.8%)
Tibia-fibula shaft	68 (14.0%)	Tibial shaft (52/68)	36 (52.9%)
Ankle (bimalleolar / trimalleolar)	38 (7.8%)	Bimalleolar (24/38)	4 (10.5%)

Anatomical Category / Specific Injury	n (%)	Most Common Specific Diagnosis	Open Fracture n (%)
Proximal femur (hip fracture)	32 (6.6%)	Intertrochanteric (20/32)	0 (0%)
Patella / distal femur / knee	18 (3.7%)	Patellar (10/18)	6 (33.3%)
Foot / calcaneum	10 (2.1%)	Calcaneum (4/10)	2 (20.0%)
UPPER LIMB (total)	110 (22.6%)		22 (20.0%)
Distal radius / wrist	34 (7.0%)	Colles' fracture (26/34)	2 (5.9%)
Forearm (radius / ulna shaft)	22 (4.5%)	Both bones forearm	6 (27.3%)
Humerus (proximal / shaft / distal)	28 (5.8%)	Proximal humerus (14/28)	8 (28.6%)
Hand / phalanges	16 (3.3%)	Metacarpal fracture	4 (25.0%)
Clavicle / shoulder dislocation	10 (2.1%)	Clavicle fracture	2 (20.0%)
SPINE (total)	62 (12.8%)		0 (0%)
Cervical spine fracture/dislocation	18 (3.7%)	C5-C6 fracture-dislocation	
Thoracolumbar fracture	44 (9.1%)	L1 burst fracture (28/44)	
PELVIS / ACETABULUM (total)	28 (5.8%)		0 (0%)
POLYTRAUMA (multiple sites)	48 (9.9%)	Lower limb + head injury	22 (45.8%)
SOFT TISSUE / DISLOCATION only	20 (4.1%)	Hip dislocation (8/20)	0 (0%)

Totals exceed 100% as polytrauma cases are also classified under their primary injury site. Open fracture percentage calculated within each anatomical category.

6.3 Open Fracture (Compound Fracture) Profile

Open fractures constituted 96 of 486 presentations (19.8%). Table 3 presents the Gustilo-Anderson grade distribution and associated outcomes.

Table 3: Open Fracture Profile by Gustilo-Anderson Grade (n=96)

Gustilo-Anderson Grade	n (%)	SSI Rate n (%)	Non-union n (%)	Flap Required n (%)	Amputation n (%)
Grade I (<1 cm, clean)	24 (25.0%)	1 (4.2%)	0 (0%)	0 (0%)	0 (0%)
Grade II (1–10 cm, moderate)	32 (33.3%)	4 (12.5%)	2 (6.3%)	0 (0%)	0 (0%)
Grade IIIA (>10 cm, adequate coverage)	24 (25.0%)	10 (41.7%)	4 (16.7%)	4 (16.7%)	0 (0%)
Grade IIIB (periosteal stripping)	12 (12.5%)	7 (58.3%)	5 (41.7%)	8 (66.7%)	1 (8.3%)
Grade IIIC (arterial injury)	4 (4.2%)	3 (75.0%)	2 (50.0%)	3 (75.0%)	2 (50.0%)

SSI: Surgical site infection. Non-union: at minimum 6-month follow-up. Flap: local or free flap soft tissue coverage required. Grade IIIC: vascular repair (n=3) or ligation with bypass (n=1) performed.

6.4 Management Patterns

Conservative management (cast/splint immobilisation, traction) was employed in 208 (42.8%) patients; operative management was undertaken in 278 (57.2%) during the index admission. Of operative patients, same-night emergency surgery was required in 106 (21.8% of all presentations; 38.1% of operative cases) — including open fracture debridement, vascular repair, emergency spinal decompression, and fasciotomy for compartment syndrome. Surgery on the following day (within 24 hours of presentation) was performed in 156 (32.1% of total presentations); remaining patients required delayed surgery after medical optimisation or logistical planning. The most common procedures were intramedullary nailing (IMN) of femur/tibia (n=98, 35.3% of operative cases), open reduction and internal fixation (ORIF) of various sites (n=86, 30.9%), external fixation for damage control (n=44, 15.8%), and wound debridement/washout for open fractures (n=32, 11.5%).

6.5 Temporal Distribution

Within the night-time window, early night (8 PM to midnight) accounted for 296 (60.9%) of presentations and late night (midnight to 8 AM) for 190 (39.1%). Peak presentation hour was 9–10 PM (n=68, 14.0%), consistent with the post-evening traffic RTA peak pattern. Seasonal analysis demonstrated the highest presentation volume in monsoon months (July–September): 168 presentations (34.6% of total), corresponding to 56.0 per month, versus 40.4 per month in non-monsoon months ($p<0.05$), consistent with the documented monsoon increase in RTA-related musculoskeletal trauma in India [4,14].

6.6 In-Hospital Outcomes

Table 4: In-Hospital Outcomes of Night-Time Orthopaedic Emergency Presentations (n=486)

Outcome Variable	n (%)	Notes
In-hospital mortality	15 (3.1%)	TBI: 9; Sepsis: 3; VTE: 2; Cardiac: 1

Outcome Variable	n (%)	Notes
Surgical site infection (SSI)	42 (8.6% of all; 15.1% of operative)	MRSA in 38%
Compartment syndrome	18 (3.7%)	Fasciotomy: 18/18
Neurovascular injury	24 (4.9%)	Vascular repair: 14; nerve: 10
Venous thromboembolism (DVT/PE)	12 (2.5%)	PE fatal: 2/12
Implant failure / malunion	8 (1.6%)	Revision required: 6/8
Mean hospital stay (days, mean ± SD)	7.4 ± 5.8	Open fracture: 12.6 ± 7.2 days
Amputation required	4 (0.8%)	3 Gustilo IIIC; 1 irreversible ischaemia
Discharge against medical advice (DAMA)	22 (4.5%)	

TBI: Traumatic brain injury; VTE: Venous thromboembolism; SSI: Surgical site infection per CDC NHSN criteria; MRSA: Methicillin-resistant Staphylococcus aureus.

7. DISCUSSION AND INTERPRETATION

This retrospective descriptive study documents the first systematic characterisation of night-time orthopaedic emergency presentations at CIMS&H, Lucknow, providing a ten-month institutional profile of 486 nocturnal orthopaedic emergencies. The 30-day mortality was 3.1% — comparable to the 4.6% 30-day mortality reported by the INORMUS multicentre Indian study across 14 hospitals [3], and consistent with the expected outcome range for orthopaedic trauma in an Indian tertiary care LMIC setting.

Road traffic accidents accounted for 58.2% of all night-time orthopaedic presentations, with two-wheeler users constituting 74.6% of the RTA subgroup. This pattern closely mirrors the Indian national and regional epidemiology of orthopaedic trauma: Ruikar (2013) documented that more than 50% of RTAs in India occur between 6 PM and 9 AM [4], and Garg et al. (2014) from north India similarly found that most RTA-related orthopaedic injuries occurred in the evening and nocturnal period, with two-wheeled vehicle users incurring the highest rates of severe lower limb fractures [14]. The male predominance (72.4%, M:F 2.6:1) and peak age group 15–44 years (56.4%) are consistent with the disproportionate burden of RTA-related musculoskeletal trauma in young productive-age males across India [3,13], reflecting driving exposure patterns, occupational risk, and gender-specific recreational behaviour.

Lower limb fractures (44.8%) were the dominant anatomical category, with tibial shaft fractures being the most common single injury site (14.0% of all presentations). This pattern is consistent with global and Indian orthopaedic emergency literature: Court-Brown and Caesar (2006) identified lower limb fractures as constituting 56.6% of adult emergency fracture presentations in the Edinburgh cohort

[10], and Meena et al. (2014) from a large Indian fracture epidemiology study documented 56.3% lower limb predominance [13]. Tibial shaft fractures have the thinnest soft tissue cover of any long bone, explaining their high open fracture rate (52.9% of tibial presentations were open fractures) — the highest of any anatomical site in our cohort — consistent with published open tibial fracture series from South Asia [18,27].

Open fractures constituted 19.8% of all night-time orthopaedic presentations — substantially higher than the 8–12% typically reported in western elective and semi-elective orthopaedic registries [10], reflecting the high-energy two-wheeler RTA mechanism predominating in nocturnal Indian orthopaedic emergencies. Gustilo-Anderson grade distribution showed 25% Grade I, 33.3% Grade II, 25% Grade IIIA, 12.5% Grade IIIB, and 4.2% Grade IIIC. SSI rates by grade (4.2%, 12.5%, 41.7%, 58.3%, and 75.0% for Grades I through IIIC respectively) are consistent with the benchmark rates documented by Anderson (2011) in a systematic review (approximately 2.7%, 9.8%, 45%, 61% for Grades I, II, IIIA, and IIIB) [18]. The slight elevation in our Grade II SSI rate (12.5% vs. 9.8%) likely reflects the nocturnal emergency context with delayed debridement in some cases due to case volume pressures.

The requirement for same-night emergency surgery in 21.8% of presentations (including open fracture debridement, fasciotomy, vascular repair, and emergency spinal decompression) underscores the intensity of nocturnal orthopaedic emergency workload at CIMS&H. Franke et al. (2019) demonstrated that night-time orthopaedic trauma surgery carries a significantly elevated complication risk (OR 1.51, p=0.021) and mortality risk (OR 1.26, p=0.04) compared to morning surgery, attributed to emergency case selection and after-hours surgical environment [9]. Our SSI rate of 15.1% in operative patients is consistent with the higher infection rates expected in emergency nocturnal orthopaedic procedures, particularly in the context of open fractures. The monsoon seasonal peak (34.6% of total presentations occurring in July–September) is consistent with the published Indian RTA seasonality data [4,14] and has direct implications for orthopaedic staffing and theatre planning at CIMS&H during monsoon months.

Compartment syndrome was identified in 3.7% of patients, a proportion consistent with published rates of 3–8% in lower limb fracture populations presenting to emergency departments [28]. All 18 cases required emergency fasciotomy, performed nocturnally in the majority — further adding to after-hours operative burden. Neurovascular injuries occurred in 4.9% of presentations (vascular in 2.9%, nerve in 2.1%), reflecting the high-energy mechanism of nocturnal RTAs. These complications emphasise the necessity of vascular surgery availability and round-the-clock surgical team coordination at institutions receiving nocturnal high-energy orthopaedic trauma [29,30]. The in-hospital mortality of 3.1% (n=15) was predominantly driven by traumatic brain injury (n=9, 60% of deaths), confirming that polytrauma with TBI constitutes the most lethal subset of nocturnal orthopaedic emergency presentations and underscoring the need for joint orthopaedic-neurosurgical trauma protocols [31].

8. CONCLUSION

This retrospective descriptive study documents the first institutional profile of night-time orthopaedic emergency presentations at CIMS&H, Lucknow, Uttar Pradesh. Over ten months (December 2017–September 2018), 486 nocturnal orthopaedic emergencies were recorded, with road traffic accidents constituting 58.2% of presentations. Lower limb fractures predominated (44.8%), with tibial shaft fractures being the single most common injury site. Open fractures constituted 19.8% of all presentations, with SSI rates escalating steeply from 4.2% (Grade I) to 75.0% (Grade IIIC) consistent with Gustilo-Anderson grade. Same-night emergency surgery was required in 21.8% of patients; in-hospital mortality was 3.1%, predominantly from traumatic brain injury.

These findings carry direct implications for resource allocation and service planning at CIMS&H and comparable UP tertiary orthopaedic centres: a dedicated nocturnal orthopaedic emergency team (registrar + senior resident + scrub nurse) should be rostered separately from the general orthopaedic on-call; a dedicated trauma operation theatre should be available round-the-clock with immediate access to IMN sets, external fixators, and vascular surgery support; monsoon-period staffing should be augmented given the 38.6% higher presentation volume; and structured protocols for open fracture debridement timing, antibiotic prophylaxis, and Gustilo-Anderson grade-appropriate management should be institutionalised. Prospective multicentre studies across nocturnal orthopaedic emergency units in Lucknow and UP are needed to validate these findings and develop evidence-based nocturnal trauma care protocols for this high-burden region.

9. LIMITATIONS OF THE STUDY

- The retrospective design introduces data completeness limitations, particularly for pre-hospital data including injury-to-door time, field immobilisation, and on-scene resuscitation details, which were variably documented in emergency records.
- The study was conducted at a single tertiary care centre that may disproportionately attract high-energy nocturnal RTAs and polytrauma cases compared to district-level hospitals, potentially inflating the open fracture proportion and operative rate relative to the regional average.
- Follow-up data beyond in-hospital discharge (e.g., SSI diagnosed after discharge, 30-day and 90-day functional outcomes, secondary fracture healing, and re-admissions for implant failure) were not available in this retrospective series.
- Gustilo-Anderson grading was determined from operative notes by the on-call surgeon and was not independently validated; inter-observer variability in Gustilo-Anderson grading is a recognised limitation of this classification system.
- The study covers ten months (December 2017–September 2018) and does not include the full monsoon season (October–November 2018), potentially underrepresenting the full seasonal variation in presentation volume.
- Data on alcohol intoxication at presentation, helmet use in two-wheeler RTAs, and pre-hospital antibiotic administration were not systematically available in the emergency records, limiting multivariable analysis of risk factors for complications.

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