

Burden Of Isolated Long Bone Fractures In Adult Patients Admitted At Moi Teaching And Referral Hospital, Eldoret Kenya

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Abstracts

Background: Long bone fractures are common in low-middle-income countries, predominantly affecting the socioeconomically active age group of the population. Such injuries have proven to be a burden to individuals, family members, the community, and the nation at large. There is paucity of published data locally and nationally. Hence the need to conduct this study at Moi Teaching and Referral Hospital (MTRH), Eldoret, Kenya.

Objective: To describe socio-demographic characteristics, in-hospital mortality, morbidity, and treatment costs associated with isolated long bone fractures.

Methods: A prospective observational study involving 412 consecutively sampled participants who met inclusion criteria. Data was collected using structured questionnaires and analyzed for socio-demographics, New Injury Severity Score (NISS), Activities of Daily Living (ADLs), Hospital Anxiety and Depression Scale (HADS), mortality, morbidity, and treatment costs, and presented in prose and diagram format.

Results: The age group 18-35 years accounted for 47% of the sample, with 68.5% engaged in informal employment. The primary cause of fractures (41.5%) was motorcycle. The mortality rate was 0.2%, with a mean HADS score of 12.2 and ADLs at 53.9. The average hospital treatment cost was 78,000 KSH, and only 22.9% had active National Hospital Insurance Fund (NHIF) subscriptions.

Conclusion: The majority of patients were young socioeconomically active males. Motorcycle-related injuries were the majority. Low mortality and high morbidity were recorded. NHIF subscription and use are still low.

Recommendations: Efforts to enhance motorcycle safety among the 18-35 age group, routine utilization of ADLs and HADS assessments, crucial appropriate total interventions and strategies to boost NHIF uptake, and transition to Social Health Insurance Fund (SHIF) are recommended.

Keywords

Sociodemographics, mortality, morbidity, and cost of treatment of Isolated Long bone fractures.

Introduction:

Long bone fractures are an important component of musculoskeletal injuries worldwide (Omoke & Ekumankama, 2020), with more than 90% of extremity fractures occurring in Low and Middle-Income Countries (Singaram & Naidoo, 2019). Lower extremity fractures have implications not only for physical disabilities affecting work and school performance but also for the quality of life of the individual (Kohler et al., 2017), and that fracture care consumes large social and financial resources (Wennergren et al., 2015).

There are few studies comparing mortality rates for a few different fracture locations, with the same population (Bergh et al., 2021), and Road Traffic Accident (RTA) deaths took place either on the spot or within 24 hours of injury with long bone counting for 31% (Farooqui et al., 2013).

The new Injury Severity Score (NISS) is a commonly used tool for the assessment of injury severity, and comparison of treatment outcomes (Li & Ma, 2021), and was found to be an index with higher predictive capability for in-hospital mortality and correlates better with the length of hospital stay and healthcare cost (Abajas Bustillo et al., 2020) and has maximum prediction in outcome when compared with the other scores (Amalan et al., 2023).

Assessment of Activities of Daily Living (ADLs) is an important aspect of routine patient assessment. It is an indicator of a person's functional status and is imperative to routinely assess for it in all hospitalized patients (Edemekong PF, Bomgaars DL, Sukumaran S, 2023).

Lower limb fracture contributes to an inability to perform ADLs (Srahbzu et al., 2018). This results in dependence on other individuals and/or mechanical devices and inability to accomplish these essential ADLs, which may lead to unsafe conditions and poor quality of life (Edemekong PF, Bomgaars DL, Sukumaran S, 2023).

Hospital Anxiety and Depression Scale (HADS) is used to measure anxiety and depression in a general population of patients, it is valid for screening purposes and not for diagnosis (Stern, 2014), HADS has demonstrated good psychometric properties and has good consistency for both depression and anxiety (Djukanovic et al., 2017).

Long bone fractures prevent an individual from performing certain activities, leading to loss of independence resulting to poorer psychological health (Farzin et al., 2011). The hospitalization cost burden is worrying due to

low NHIF subscribers, coupled with poor management prompting the government to consider transiting to SHIF with a hope of more efficient healthcare service delivery to patients.

Despite available data, isolated long bone fractures are overlooked, despite the World Health Organization's acknowledgment of their significant impact (Haagsma et al., 2016). Research on socio-demographic characteristics, mortality, morbidity, and treatment costs are lacking at MTRH, and orthopaedic surgeons often overlook mental health consequences (Scott, 2002).

Methods:

Settings: The study was conducted at MTRH orthopaedic wards with institutional approvals and licenses.

Design: A descriptive prospective study included 412 adult patients with new isolated long bone fractures between January 1st, 2022, and December 31st, 2022, and based on the established eligibility criteria.

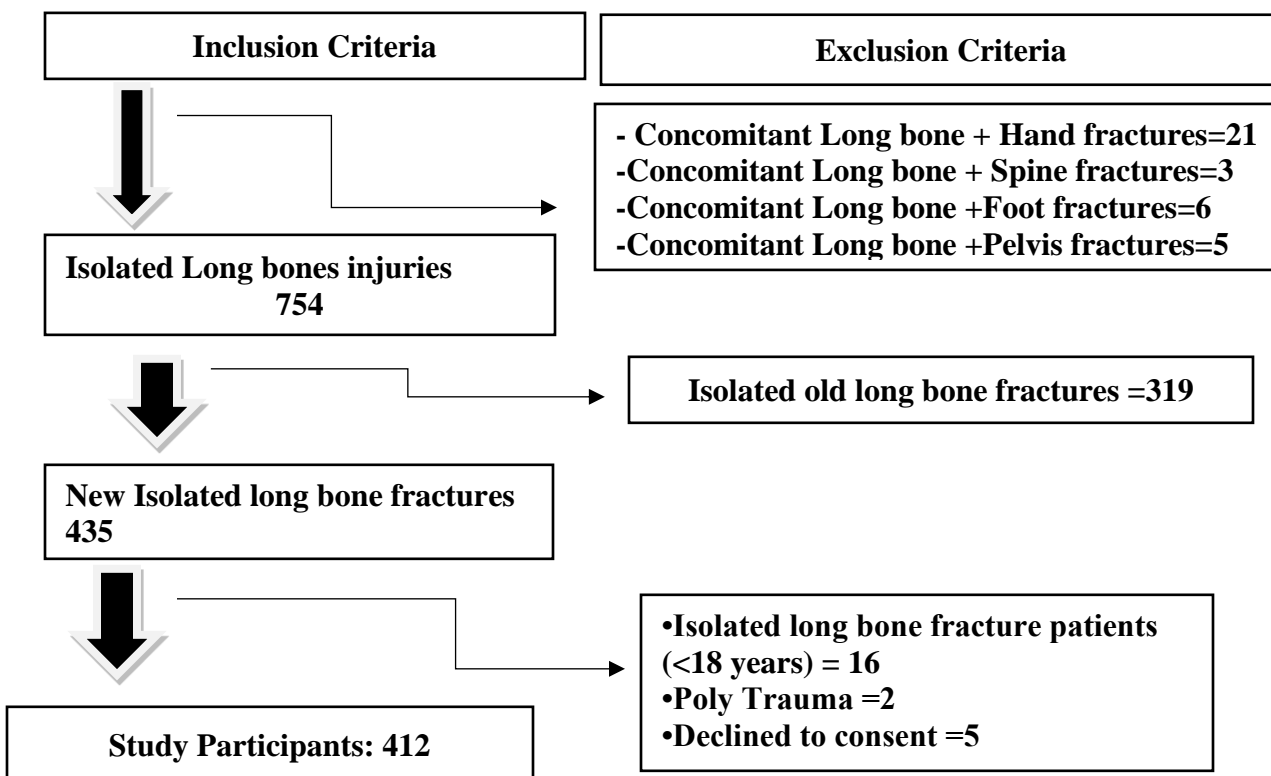


Figure 1: Eligibility Criteria.

Patients were treated as per established hospital guidelines and protocols with modifications where needed according to patient needs, provider preference, and local availability, and structured questionnaires were used to collect data as shown below

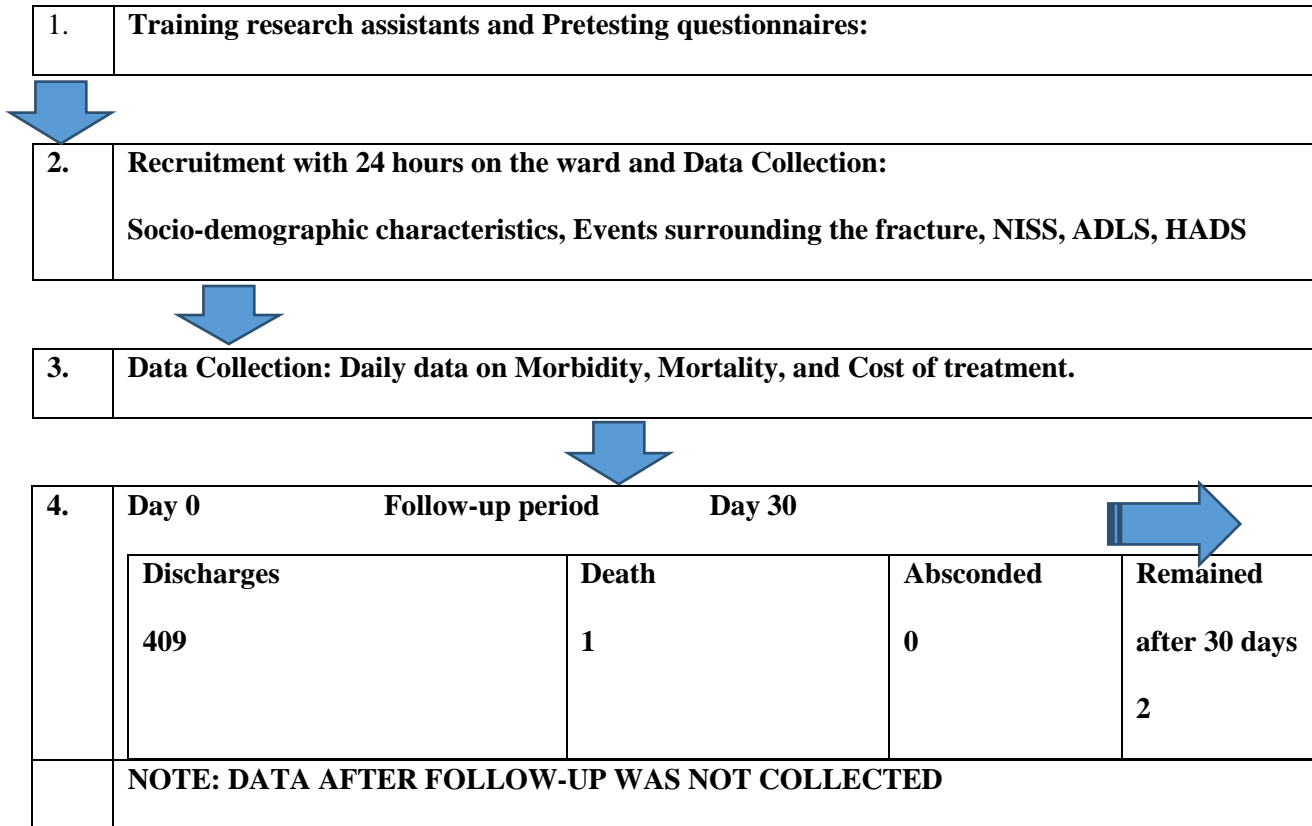


Figure 2: Study procedure.

Data was organized, cleaned and analysed using statistical package for social science software.

Results:

Table :1 **Socio-demographic characteristics**

Sex	Male 74% (n=305) and 26% (n= 107) were Female.
Age	18-35 years 47% (n=194) ,36-59 35%(n=144) and ≥ 60 18% (n=740)
Occupation Status	Informal 68.5%(n=282) , Unemployed 14.6%(n=61), Students 9.0% (n=37) and Formal employment 7.8% (n=32)
Referral Status	Referred to MTRH 66 % (n=272) and Self-referrals were 34 % (n=140)

Aetiology	Motorbikes 41.5% (n=171) , MVA 22.8% (n=94), Falls 9.2% (n=38), Pathological fracture 1.9 % (n=8), Gunshot 1.7% (n=7), Sport 0.7% (n=3) and Others 6.1% (n=25)
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Table: 2 Mortality and Morbidity

Mortality	In-hospital mortality 0.2% (n=1).	
Morbidity	AIS ²	MEAN(SD)AIS ² =13.9 (SD: 5.4),
	ADLs	MEAN(SD) ADLs= 53.9 (18.1)
	HADS	MEAN(SD) HADS= 12.2 (7)
	Physical and Physiological	Blood requiring transfusion=25, Peripheral nerve injury=14, Fracture related infection=9,
Treatment Cost	MEAN COST OF TREATMENT = 78,000 KSH , NHIF SUBSCRIBERS = 22.9 %	

Discussions

Socio-demographic characteristics

These patients were predominantly young adult males, aligning with findings from various studies (Ayumba et al., 2015); Ibrahim et al., 2023; (Mahdian et al., 2017); (Matos, 2014);(T. Nana et al., 2021); (Okullo et al., 2021); (Omoke & Ekumankama, 2020)). RTAs emerged as a major cause of fractures, concurring with other research findings (Fernandes et al., 2015); (Morris S, Lenihan B, Duddy L, 2020); Nana et al., 2021; (Singaram & Naidoo, 2020a).

This age group is known for its energy and productivity, often making up a significant part of a country's workforce. Mahdian et al., (2017) in Iran found similar trends, linking the high incidence of fractures in young males to inexperience and peer influence. Conversely, Teshale et al., (2020) noted a rise in geriatric fractures due to falls and conditions like osteoporosis. Many participants were engaged in informal employment, as seen in studies in low-income countries like Ethiopia (Birlie et al., 2023). Motorbike accidents were a major cause of long bone fractures, with almost half involving riders, showing a higher rate than commercial riders in Uganda

(Kironde et al., 2019). Referrals were common, reflecting the hospital's role as a regional referral facility, as found in previous research (Ayumba et al., 2015).

The in-hospital mortality in adult patients admitted at MTRH with isolated long bone fractures.

The in-hospital mortality rate for patients with long bone fractures at MTRH was exceptionally low at 0.2% (n=1). This contrasts with findings by Larsen et al., (2020), who reported a mortality rate of 0.7%, including deaths immediately after femur surgery and within 3 to 8 days post-surgery. In the USA, Onizuka et al., (2023), found a higher mortality rate of 4.1% following surgery for distal femur fractures in older adults. Streubel et al., (2011) reported an overall mortality rate of 38% for distal femur fractures over a maximum follow-up of 9.8 years, with rates of 6%, 18%, and 25% at 30 days, 6 months, and 1 year post-surgery, respectively. These findings suggest that while in-hospital mortality is low, longer-term mortality rates increase significantly, highlighting the importance of extended follow-up beyond hospital discharge.

Morbidity in adult patients admitted at MTRH with isolated long bone fractures and ADL

The study found that people faced severe difficulties with ADLs, as shown by their Barthel Index Activity scores. This matches findings from Yeh et al., (2023), linking these difficulties to lower quality of life and increased burdens on caregivers. Wu et al., (2022) also confirmed a connection between depressive symptoms and hip fractures among older adults, highlighting the impact of fractures on activity of daily living and reduced quality of life, as noted by (Røpke et al., 2022).

Physical and physiological impact of isolated long fractures on admitted patients

Recent examination discovered a low occurrence of in-hospital complications among patients. In a seven-year study in Australia, Wertheimer et al., (2018) found that 36% of patients with femur fractures needed blood transfusions, while this study revealed only 6.1%. This difference likely stems from the higher blood loss in femur fractures compared to forearm fractures, which the study focused on. Huckhagel et al., (2018) reported a nerve injury rate of 1.8% in European fracture patients, contrasting with the finding of 3.4% in this study. Their study focused solely on upper limb nerve injuries, whereas this study included both upper and lower limb injuries.

Fracture-related infections were seen in 13.24% of cases in one study and wound infections in 43.1% in another, while this study found a lower rate of 2.2%, possibly due to adherence to hospital protocols on antibiotic use.

The psychological impact of isolated long fractures on admitted patients

The mean HADS indicated significant impairment in both physical and mental aspects compared to the normal population, suggesting underlying mental health challenges in isolated long bone fracture patients. This pattern concurs with findings in other studies, highlighting the screening tool's ability to detect such issues before clinical signs emerge. Orthopedic trauma often leads to depressive symptoms, with a mean HADS score of 12.2, as seen in studies by some authors (Liu et al., 2021; Singaram & Naidoo, 2020b). In long bone fractures, a significant portion of subjects experienced depression (58.8%) and anxiety (70.0%) at baseline, according to Braimah et al., 2017. Additionally, the prevalence of depression and anxiety, measured by HADS, was high in other studies as well: 36.1% and 39.8%, respectively (Srahbzu et al., 2018).

The cost of treatment in adult patients admitted at MTRH with isolated long bone fractures

The majority of patients (76%) lacked NHIF coverage (KNBS, 2023). Only 22.9% of participants in the current study were active NHIF subscribers, highlighting low coverage. Approximately 1 in every 4 persons in Kenya has some form of health insurance. This has prompted the government to consider establishing SHIF, with a hope that all patients will be covered. NHIF is thus transiting to SHIF.

The mean treatment cost was 78,000 KSH, notably lower than in other studies (Cholo et al., 2023; Pan et al., 2014; Shin et al., 2016). This is attributed to MTRH's status as a government health facility, which offers subsidized costs to ensure affordability.

In a study by Pan et al., (2014) in Taiwan, focusing on fractured cases, mean costs were US\$1260 for upper limb and US\$1905 for lower limb fractures. This is in contrast with the findings in this study due to Taiwan's universal NHI program, covering 99.88% of the population and maintaining a 70 percent public satisfaction rate, unlike the NHIF of Kenya.

Conclusion:

The burden was notable on young males, and motorbikes were the leading cause of fractures.

Severe dependency ranges for the activity of daily living, abnormal mean scores for hospital depression and anxiety, and barely a quarter of study participants had NHIF coverage.

Recommendations:

Safety of motorcycle users especially among the 18-35 years age group.

Routine assessment for the ADLs and appropriate intervention,

Adapting HADS for psychosocial assessment, psychosocial support, and counseling should be implemented as part of standard care for patients with fractures.

Promote strategies for increasing NHIF uptake among the informal sector, and be prepared to shift to SHIF.

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