

# Demography of orthopaedic admissions in a secondary care hospital in Oman

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## ABSTRACT

**Introduction:** There is noticeable rise in the number of orthopaedic admissions across the globe. However, there is a lack of published data on the types of injuries requiring admissions, especially in the Middle East region. We conducted this retrospective study to assess the demography of orthopaedic casualty admissions. **Materials and Methods:** The study included all orthopaedic admissions (n=424) from the Accident and Emergency Department (AED), Al-Buraimi Hospital between January 2010 and December 2012. Data were collected using electronic database of the hospital (Hospital Information Management System-HIMS). All the orthopaedic admissions from the outpatient department, elective cases and other surgical non-orthopaedic injuries admissions were excluded from the study. **Results:** Out of the 424 patients, 341 (80.4%) were male and 83 (19.6%) were female. The mean age of the patients was 29.9 years (range, 1-84 years). Road traffic accident (RTA) was the major cause of admissions (n=155, 36.6%). The other causes were domestic injuries (n=101, 23.8%), occupational injuries (n=74, 17.5%), sports injuries (n=37, 8.7%) and other injuries (n=57, 13.4%). Surgical treatment was required by 277 (65.3%) patients, while 147 (34.7%) patients were treated by non-operative methods such as plaster immobilisation. The mean duration of hospitalisation was 4.2 days (SD  $\pm$  0.2) and the mortality rate was 1.2% (n=5). The causes of death were hypotension due unstable pelvic fracture (n=1) and secondary sepsis (n=1, infected open fracture, and secondary lung sepsis (n=3). The mean duration of hospitalisation in these patients who died was 19.6 days (SD  $\pm$  16.4). **Conclusions:** Most of the orthopaedic casualty admissions were due to RTA injuries, followed by household and occupational injuries. There is a need for better preventive measures in order to reduce the burden on local health system.

**Keywords:** Demographic analysis, retrospective, orthopaedic, admissions

## INTRODUCTION

In recent time, there has been a noticeable increase in the number of hospital admissions

for road traffic accidents (RTAs) injuries as results of increase in motor vehicles and industrialisation.<sup>1, 2</sup> However, there are other causes such as house old injuries, assaults, occupational and sports injuries contributing to orthopaedic admissions. In the Middle East, including Oman, expatriate workers contrib-

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ute greatly to the work force. They are exposed to a significant number of work related injuries.

In our hospital (Al-Buraimi Hospital, Oman), there were 34,882 casualty outpatients visits in 2012. The largest number of casualty patients who were admitted were admitted to the orthopaedic service. Data on the volume and pattern of hospital admissions in Oman and the other Middle East countries are currently largely unknown. This study was conducted to describe the epidemiology of orthopaedic emergency admissions and their treatment outcomes. It also hoped the findings will provide baseline data for establishment of preventive strategies, as well as treatment protocols and assessing the changes in admission epidemiology.

**MATERIALS AND METHODS**

After institutional ethical committee approval, we carried out a retrospective study from January 2010 to December 2012 involving all the direct admissions to the orthopedic surgical service from the Accident and Emergency Department (AED).

Data of patients were retrieved using the electronic data system (HIMS-Hospital information management system) maintained by the hospital. This method of data collection was used as the computerisation of the hospital attendance and admission records and improvements in the coding of patient

data had resulted in the improvement in the quality of data on epidemiological surveillance of injuries.

The study included all patients admitted directly to the orthopedic service through the AED. We excluded from the study other admissions from outpatient department, elective cases, and other non-orthopaedic surgical injuries admissions. During this study period, there were total 823 orthopaedic admissions. Of these, 447 patients were admitted directly from the AED. Twenty-three patients were excluded from the study, as they were not treated in our hospital for various reasons, leaving the remaining 424 patients (51.5%) for the study. The collected data was analysed and was subjected to simple statistical calculations. The patients were categorised into different categories depending on their ages. The software used for statistical analyses was the Statistical Package for Social Sciences (SPSS), Version 17.0.

**RESULTS**

Out of total 424 patients included in the study, 341 (80.4%) were male and 83 (19.6%) female. The mean age of patients was 29.9 years (range, 1-84 years). There were 61% (n=259) local and 39% (n=165) expatriate patients. The breakdown of patients age groups is shown in figure 1.

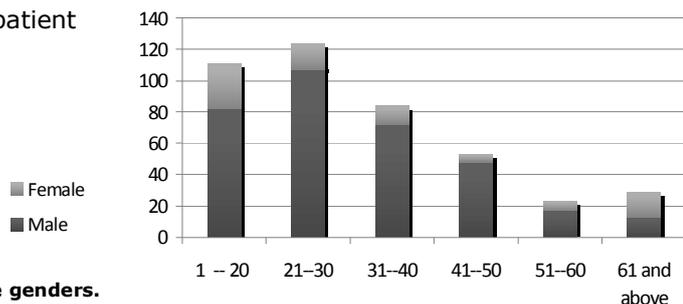
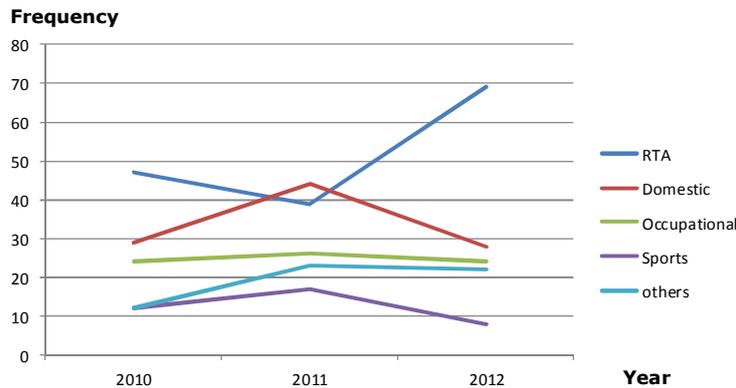


Fig. 1: Age breakdown between the genders.



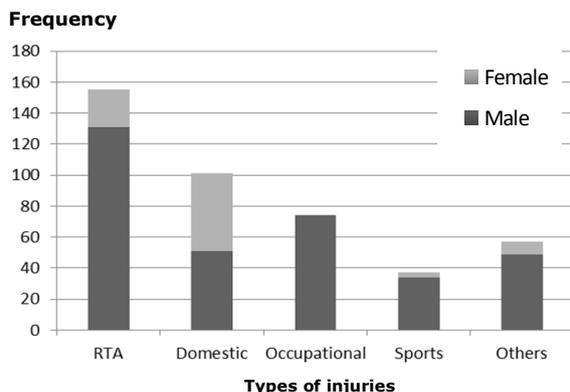
**Fig. 2: Admission trends based on mechanisms of injuries.**

The aetiological trends of injuries leading to admissions over the three years period is shown in figure 2.

The aetiology of injuries is shown in figure 3. RTAs were the most common cause (36.6%): cars collision injuries (67.7%), two wheeler vehicles injuries (18.1%), and pedestrian injuries (14.2%). Domestic injuries accounted for 23.8%: falls for various reasons at home (74.3%) and others household injuries (25.7%). Occupational or work-related accounted for 17.5%: machinery crush injuries of various parts of upper limb (63.5%) and falls at working site (36.5%). Sports injuries occurred in 37 patients (8.7%), mainly due to football related injuries such as anterior cruciate ligament (ACL) tear (n=14), meniscus injuries (n=6), shoulder dislocation (n=2), and fractures (n=15).

Surgical treatments were required in 277 (65.3%) patients, while 147 (34.7%) were treated non-operatively such as with plaster immobilisation. The number of surgeries performed each year compare to number of admissions are illustrated in figure 4.

Among the patients needing surgical intervention, 301 surgeries were performed: 163 (54.2%) lower limbs, 128 (42.5%) upper limbs, and 10 (3.3%) pelvis-acetabulum surgeries. Two hundred (66.4%) were open and 101 (34.6%) closed surgical procedures. The number of injuries involving geriatric patients requiring surgery was 5.4% (n=23). There were 22 patients (5.2%) with other associated injuries: nerve injuries in four, knee instability in three, vascular injury in one, and other general surgical injuries in 14. Twelve patients were poly-trauma cases.



**Fig. 3: Distribution according to mechanisms of injury.**

In the non-operative group, there were 69 upper and 78 lower limbs injuries. The majority of injuries in this group were

**Table 1: Details of patients who died.**

No	Age/ Gender	Mechanism of Injury	Diagnosis	Treatment	Time to Death	Complications leading to death
1	31 / M	Car turn over	Unstable pelvic fracture	Unsuccessful resuscitation	4 hours	Hypotension
2	45 / M	Truck run over	1) Grade IIIB Open fractures both bones leg. 2) C 6/7 vertebra fracture dislocation with spinal cord injury	Wound debridement/external fixator application	46 days	1) Infected open fracture with MRSA 2) Quadriplegia
3	71 / F	Fall at home	Inter-trochanteric fracture femur	DHS fixation	17 days	Pneumonia
4	82 / M	Fall at walking	Fracture neck of femur	DHS fixation	20 days	Pneumonia
5	69 / M	Fall at home	Inter-trochanteric fracture femur	DHS fixation	14 days	Pneumonia

Legend: DHS; dynamic hip screw, MRSA; methicillin resistant *Staphylococcus aureus*

either undisplaced, minimally displaced fracture, or soft tissue injuries. Upper limb injuries included distal radius fracture (n=27), and green stick fracture involving the small bones of the hands (n=9). Lower limb injuries were fractures involving the small bones of the feet (n=37), calcaneum fractures (n=12), undisplaced malleolar fractures (n=10), undisplaced fractures of the shaft of the tibia (n= 8), and tibial condyle fractures (n=11).

The overall mean duration of hospitalisation was 4.2 days/patient (SD ± 0.2), slightly longer in the surgical group (4.7 days, SD ± 4.9)and slightly shorter in the non-operative group (3.8 days, SD ± 2.8).

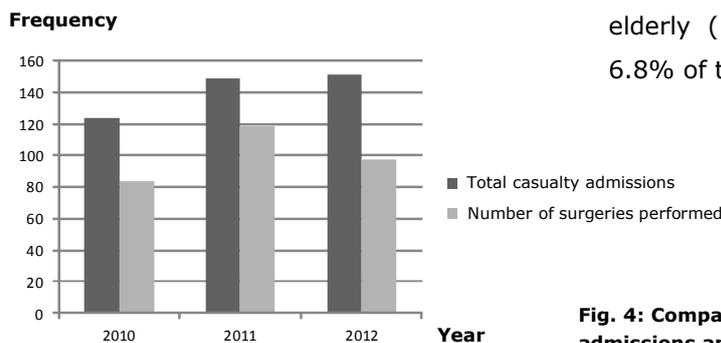
There were 19 patients who had complications: infections (n=2), incomplete nerve injury (n=3), stiff joints (n=5), re-fractures

(n=2) and tight plasters requiring admissions (n=2), and one each of major limb amputation, pulmonary embolism, vascular injury vascular injury requiring surgical repair, cerebrovascular accident, and myocardial infarction.

The mortality rate was 1.2% (n=5). The details of these patients is shown in table 1.

**DISCUSSION**

Orthopaedic service is one of the departments that bears a significant load of casualty admissions. Globally, trauma is the main cause of orthopaedic admissions. In our study, men contributed significantly to the volume of casualty admissions and half were below the age of 30 years. The peak age group of patients with injuries was 21 to 30 years. Thereafter, there was a noticeable reduction in numbers of patients admitted as the age increase with elderly (>65 years) patients accounting for 6.8% of the total admissions.



**Fig. 4: Comparisons between the total number of admissions and the surgeries performed.**

Generally, there were more boys than girls with lower extremity fractures, with approximately half between the ages of 13 and 20 years.<sup>3</sup> The majority of injuries occurred in males (67-80%) and the most frequent age group injured was between ages 0 and 9, representing 40% of cases. Children and adolescents accounted for 22% of those with RTA who sought care.<sup>4</sup>

In our study, RTA was the major reason for admissions (36.6%). As expected, there were more men than women with a ratio of 5.5:1. Similar to what is widely known, people aged 18-40 years were the major victims of RTA in our locality. The RTA injuries in our studies were mainly from car collisions and overturned vehicles. RTA accounted for 35.1% of all traumas, the largest single external cause of severe injury in a population of Kampala, Nigeria.<sup>5</sup> In this study, motor vehicle accidents was also the most frequent cause of injury-related emergency department visits (8%), followed by domestic injuries (7.2%) and workplace accidents (6%).<sup>6</sup> In contrary, trauma was the third most common reason for hospital admissions and this accounted for 43% of all the surgical cases. RTAs was the fourth common cause. The most common causes of injury were tribal conflicts (24%), domestic violence (14.3%), assault (16.7%), road accidents (14%) and domestic accidents (25.1%), which comprised falls, penetrating wounds and bites.<sup>7</sup> People aged between 18 and 45 years were the major victims of RTA, and accounted for 70% of the total RTA-related admissions in the primary and secondary level hospitals respectively in Bangladesh.<sup>8</sup>

In our study, domestic injuries were

the second most common cause (23.8%) of casualty orthopaedic admissions. Most were either falls or injuries whilst doing household chores. Both genders were equally affected (ratio 1.1:1) with similar age distributions of up to 41-50 years, followed by an increase in females and a decrease in males at higher age.<sup>9</sup>

Occupational injuries were third most common cause for admission (17.5%). Of these, crush injuries involving the upper limbs (63.5%) caused by electrical saw were common, and this was often associated with subtotal or total finger amputations. In our study, occupational injuries probably correlated with the progressive rise in industrialisation and infrastructure development in our locality. Most of our patients with acute hand injuries were engaged in machine related works. The ratio of males to females in cases with acute hand injuries was 57:1.<sup>10</sup> Similarly, the majority of these workers were male (93%). The most common age group involved was between 25 and 35 years (48%). Laceration was the most common injury followed by fractures and crush injuries.<sup>11</sup> Contrary to above studies, in our study all occupational injuries patients were male (100%,  $n=74$ ), and most of them resulted in crush injuries of hand involving fingers. The most common sites of fractures in occupational injuries were in the lower extremities.<sup>12, 13</sup> In our study, lower limb injuries were more than upper limb injuries, both in the surgical and non-surgical groups.

In our study, sports injuries accounted for 8.7% of admissions, and the majority were male (M: F=11.3:1). The most common injuries were soccer or football related (90%).

Other causes included assault, police firing and suicidal injuries that accounted for 13.4% of admissions. Men were most commonly involved in these injuries (M:F=6:1).

There was progressive increase in the number of admissions over the study period. This could be due to increase in the local population, road traffic movement and industrialisation. The number of operative procedures was 65.3%. There was no increasing trend observed. There were 47.2% closed and 23.8% open injuries, 57 patients (52.8%) sustained open fractures requiring emergent orthopaedic intervention.<sup>13</sup> The incidence of open injuries in our study were noticeably lower, possibly due to various mechanisms of injuries. The duration of hospitalisation was 4.2 days/patient and this was also lower compared to other studies. The shorter duration of hospitalisation may be due to more number of patients who had isolated injuries. The average length of hospital stay of admitted patients was 35.4 days and the mortality rate was 1.4%.<sup>14</sup>

The mortality rate in our study was 1.2% (n=5). Tan *et al*, reported a mortality rate of 2.8% following acute orthopaedic trauma admissions in a trauma centre in the United Kingdom.<sup>15</sup> In series of 2,418 patients, there were 84 deaths giving an overall crude mortality rate of 3.5% of those with orthopaedic and trauma admissions.<sup>17</sup> Our mortality rate is noticeably low compared to other studies in literature. High mortality rate of 17.5% was reported in one study and average length of hospital stay was 23.5 ± 12.3 days. Patients at high risk of mortality were often poly-trauma with severe head, chest or abdominal injuries and were often admitted

under the general surgeon. This may be a reason for the low mortality rates in our study.<sup>16</sup>

There were several limitations in our study that needed to be discussed. First, the study duration was short. The epidemiology could have been better analysed, if the study was conducted for a longer duration and with a larger sample size. Second, the retrospective nature of our study is always associated with limitation. Third, our study did not include patients who were transferred to other hospitals and those who declined the treatment. This could mask the true end results of treatment.

In conclusion, there was a progressive increase in numbers of orthopaedic injuries from RTAs, household and work place injuries. The local hospitals need to be better equipped to match the increasing patient input. At the same time, the local administration needs to focus on implementation of better preventive measures in order to reduce the burden on local health system.

## REFERENCES

- 1: Barrimah I, Midhet F, Sharaf F. Epidemiology of road traffic injuries in qassim region, saudi arabia: consistency of police and health data. *Int J Health Sci (Qassim)*. 2012; 6:31-41.
- 2: Chi GB, Wang SY. Pattern of road traffic injuries in China. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2004; 25:598-601.
- 3: Gao Y. Children hospitalised with lower extremity fractures in the United States in 2006: a population-based approach. *Iowa Orthop J*. 2011; 31:173-80.
- 4: Hyder AA, Amach OH, Garg N, Labinjo MT. Estimating the burden of road traffic injuries among children and adolescents in urban South Asia. *Health Policy*. 2006; 77:129-39.
- 5: Andrews CN, Kobusingye OC, Lett R. Road traffic

accident injuries in Kampala. *East Afr Med J.* 1999; 76:189-94.

**6:** Lorini C, Berti A, Voller F, et al. Injury-related Emergency Department visits in Tuscany (Italy). *Ig Sanita Pubbl.* 2007; 63:45-63.

**7:** Matthew PK, Kapua F, Soaki PJ, Watters DA. Trauma admissions in the southern highlands of Papua New Guinea. *Aust N Z J Surg.* 1996; 66:659-63.

**8:** Mashreky SR, Rahman A, Khan TF, Faruque M, Svanström L, Rahman F. Hospital burden of road traffic injury: major concern in primary and secondary level hospitals in Bangladesh. *Public Health.* 2010; 124:185-9.

**9:** Majori S, Ricci G, Capretta F, Rocca G, Baldovin T, Buonocore F. Epidemiology of domestic injuries. A survey in an emergency department in North-East Italy. *J Prev Med Hyg.* 2009; 50:164-9.

**10:** Yi CJ, Tian GL, Tian W, et al. An epidemiological investigation of acute occupational hand injuries. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi.* 2011; 29:371-3.

**11:** Abdullah S, Jaafar JM, Das S, Sapuan J. An insight into industrial accidents involving the hand. *Clin Ter.* 2009; 160:427-33.

**12:** Amin NH, Jakoi A, Katsman A, Harding SP, Tom JA, Cerynik DL. Incidence of orthopedic surgery intervention in a level I urban trauma center with motorcycle trauma. *J Trauma.* 2011; 71:948-51.

**13:** Wick M, Ekkernkamp A, Muhr G. Motorcycle accidents in street traffic. An analysis of 86 cases. *Unfallchirurg.* 1997; 100:140-5.

**14:** Ahmed E, Chaka T. The pattern of orthopedic admissions in Tikur Anbessa University Hospital, Addis Ababa. *Ethiop Med J.* 2005; 43:85-91.

**15:** Tan HB, MacDonald DA, Matthews SJ, Gianoudis PV. Incidence and causes of mortality following acute orthopaedic and trauma admissions. *Ann R Coll Surg Engl.* 2004; 86:156-60.

**16:** Chalya PL, Mabula JB, Dass RM, et al. Injury characteristics and outcome of road traffic crash victims at Bugando Medical Centre in Northwestern Tanzania. *J Trauma Manag Outcomes.* 2012; 6:1.

**17:** Orimolade EA, Akinyoola AL, Ikem IC, Oginni LM, Olasinde AA, Esan O. Mortality among orthopaedic and traumatology admissions: a ten year review. *East Afr J Public Health.* 2010; 7:361-6.