

# Analysis of Emergency Care of Trauma Patients with References to the Type of injuries, Treatment and Cost

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**Background:** Musculoskeletal trauma (MST) is one of the most vital public health challenges in the new century. It is expected that approximately one fifth of the entire universal burden of disease is due to trauma.<sup>1</sup> The study was designed to see the mode, initial management and cost of trauma victim in our setup.

**Study Design:** Prospective Analytical study design.

**Settings:** Emergency department of Orthopedics Unit I (Formally Unit-II).

**Methodology:** In this study all patients were included who presented at Emergency department of Orthopedics with musculoskeletal trauma having age more or equal 14 years during 2004 and who did not require any neurosurgical or general surgical interventions.

**Total number of patients:** This was a time based study; the total number of patients was 1289 during the year of 2004.

**Results:** The average age of patients was  $43.12 \pm 10.20$  years. There were 99% people who presented with fractures and 1% with dislocations. The most common mode of injury was road traffic accidents i.e. 51.66% and the proportion of closed fractures was 71%. The average cost of emergency was Rs1180.50  $\pm$  300.86 per patient. 67.6% patients were treated and discharged in the emergency on the same day and 32.4% patients were admitted for the further treatment.

**Conclusion:** The major cause of trauma is road traffic accidents. The patients were treated and discharged; a few were admitted to the ward for further treatment(s). The most widely used procedures were application of POP, Back Slabs and fixation with NA external fixator. The average cost is Rs. 1180.50/patients.

**Key Words:** Road Accidents, Musculoskeletal Trauma and Cost Analysis.

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## Introduction

Musculoskeletal trauma (MST) has been an important reason of mortality and morbidity in past and recent years. It has become a very serious public health problem not only in urbanized societies, but also in middle and low-income countries. It is the ninth leading cause of death world wide.<sup>1-3</sup> The contribution of musculoskeletal trauma to morbidity and mortality in developing countries is often underestimated.<sup>4,5</sup> But an estimated 33 million people in USA sustained injuries with an incidence of 0.138%. Musculoskeletal trauma is highest in persons with 18-44 years of age and this has a major socioeconomic effect.<sup>6</sup> Annually, the average number of injuries resulting in restriction of activities is 30.6 million with 13.4 million of these severe enough to require bed rest. This translates into 1.54 million acute hospitalizations of an average duration of 7.1 days and about 45000 deaths over one year period.<sup>6,7</sup>

Generally, 1.26 million people died in road traffic accident (RTA) in the world during 2000 and out of these 35% deaths occurred in the South East Asia.<sup>8</sup> Normally, 10-15 million inhabitants are injured every year in RTA and 90% of all road traffic accident people died in low and middle-income countries.<sup>9</sup> In many developed countries, RTAs are also the a significant cause of trauma and death. Fractures due to motor vehicles are the foremost cause of morbidity

and death mainly in young people, and include 80% of the males.<sup>1</sup> In developing countries it is estimated that the cost of RTAs burden is 0.01-0.04 times of a country's GNP per years. It is also forecasted that in 2020 the RTAs will charge for almost 23 million deaths and it will be the 3<sup>rd</sup> top cause of mortality and morbidity.<sup>10</sup>

There are also so many other reasons of traumatic mortality and morbidity like; sports injuries constitute 25.9%.<sup>11</sup> MST, work related injuries and mortalities are 0.038%<sup>12</sup> and deaths due to violence has been reported 0.22%.<sup>13</sup> The burden of musculoskeletal trauma could be considerably decreased by implementing affordable and sustainable strategies to reinforce orthopaedic trauma care, particularly in under developing countries.<sup>14</sup>

This study was designed to know about the type of musculoskeletal injuries burden/cost and management of trauma patients presented in accident and emergency department Mayo Hospital Lahore.

## Aims and Objectives

The objectives of this study were to:

1. Explore the major cause of trauma presenting at Accident and Emergency department of Lahore.
2. See the acute management of patients with references to the types of trauma.

3. Estimate the cost of emergency treatment (medicine provided by the Hospital and purchased by patient).

## Materials and Methods

**Study Design:** Interventional Longitudinal study design was used.

**Settings:** Present study was conducted at Emergency Department of Orthopedics Unit I (formally unit II) in 2004.

**Selection of patients:** All patients above 14 years of age presented with acute musculoskeletal trauma were included in this study. Patients presented with chronic (one or more week old) injuries or who needed neurosurgical or general surgical interventions were excluded from this study.

**Total number of patients:** This was a time based study so the total number of patients was 1289 during the year of 2004.

**Methodology / Management:** After receiving the patient at A & E department of Orthopedics, the patient was re-evaluated for air way, breathing and circulation (ABC of ATLS) and was managed accordingly. Patients were given analgesic for pain and Splintage was applied to the critical areas. If the patients had wound, it was covered with sterilized gauze and antibiotics/ tetanus prophylaxis were also given. X-rays of the affected region(s) were obtained along with routine investigations. In addition, X-ray chest PA view, ECG, Blood Sugar Random, Blood Urea, Serum Creatinine were obtained for the patients having age more than 40 years. Emergency procedure was decided after examining patient's wound and X-Ray type of injury. After injecting analgesia and antibiotic in case of wounds or open fractures, the required procedures were performed. Moreover, closed and stable fractures were reduced and plaster of Paris was applied. For open fractures, debridement and external fixators were applied when needed.

**Statistical Analysis:** All data were analyzed using SPSS 13 and output for metric (quantitative) data were presented as Mean  $\pm$  S.E. Non-metric data (Categorical) were presented in form of frequency tables and percentages. Non-parametric chi-square test for proportion was used. Bar chart was also used for non-metric data. A p-value less than 0.05 was taken as significant.

## Results

The average age of patients was  $43.12 \pm 10.20$  years. The age of 80% patients was between 14- 40 years, which show that the musculoskeletal trauma occurred in people of productive age. The male to female ratio was 3.75: 1. The proportion of male patients was significantly higher than the female ( $p$ -value=0.000). Six hundred and sixty six (51.66%) patients were victim of road traffic accident, 30% got MST in sports/work and 18% were injured in domestic violence. MST due to road traffic accidents was statistically significant in this study ( $p$ -value =0.00).

Fractures of Tibia (28.94%), Femur (19.01%), Humerus (11.02%), Ulna (7.99%) and Radius (6.98%) were considerably high in this study ( $p$ -value =0.000). According to the fracture type 915 (71%) were closed and 361 (28%) were open fractures, in 1% patients there was dislocation in which shoulder was mostly involved. In current study closed fractures were statistically more prevalent ( $p$ -value =0.000).

POP was applied in 27% followed by Back Slabs (17%) and NA external fixator 16.33% of the patients. Skin traction and skeletal traction were applied in 9.66% and 12 % respectively. The patients of shoulder dislocation and clavicle fractures 0.8% were treated using polysling. Moreover 2.33% of patients were managed by crape bandage only. The patients who had stable pelvic and spine injuries were treated by analgesic. The K-Wire was passed in 7.33% of the patients. Open reduction and internal fixations were performed in 3% of the patients. Sixty-one DCP were applied in radius and ulna and 19 tension band wiring were applied on medial malleolus. 12 patients were treated with tension band wiring of patella. Debridement was done in 80 patients according to their intensity of injury and contamination. 67.6% patients were treated and discharged in the emergency on the same day and 32.4% patients were admitted for the further treatment. The average cost on emergency management of all cases was Rs.  $1180.50 \pm 300.86$ . The total amount spent on patients was 3541580 with minimum Rs. 120/- and maximum Rs: 3300/-. Only 75000 were paid by patients and rest of the amount was paid by the hospital. Hospital supplied, syringes, antibiotics, analgesic, Vicryl, Proline Normal Saline, Ringer lactate Haccele and external fixator etc. Patients paid only for implants of internal fixation for instance DCP which were not provided by the hospital.

**Table 1:** Descriptive Statistics for age (years) and Cost (Rs.)

	Age (year)	Cost (Rs.)
Mean	43.12	1180.50
S.D	10.20	300.86
Range	76 (14-90)	3180

## Discussion

The worldwide dilemma of injury is very serious and is expected to be a leading cause of morbidity and mortality over the next few decades.<sup>1-6</sup> In middle income-countries this burden will be at peak due to lack of preventive strategies, nonexistent and barriers to the timely and appropriate care of the injured. The load of injury in underdeveloped and developing countries has grown to be public health precedence. So-called important services, which are high-yield, low-cost, and target key health problems, should be available to everyone in the world.<sup>15</sup> In a healthcare center for trauma-victim (Accident and emergency department of orthopedics Mayo hospital Lahore), most of the patients

**Table 2:** Frequency distribution for Categorical Variables.

		Frequency (percentage)	p-value
<b>Gender</b>	Male	1018 (78.97%)	0.000 (a)
	Female	271 (21.02%)	
<b>Mode of Trauma</b>	RTA	666 (51.66%)	0.000 (b)
	Sports/work	387 (30%)	
	Violence	232 (18%)	
	Others	4 (0.31%)	
<b>Bone Involvement</b>	Ankle	52 (4.03%)	0.000 (c)
	Clavicle	26 (2.02%)	
	Femur	245 (19.01%)	
	Foot	53 (4.11%)	
	Hand	79 (6.13%)	
	Humerus	142 (11.02%)	
	Mandible	10 (0.77%)	
	Patella	46 (3.57%)	
	Pelvic	51 (3.95%)	
	Radius	90 (6.98%)	
	Scapula	13 (1.01%)	
	Tibia	373 (28.94%)	
	Ulna	103 (7.99%)	
Back injury	6 (0.46%)		
<b>Types of Injury</b>	Open	361 (28%)	0.000 (d)
	Close	915 (71%)	
	Dislocation	13 (1%)	
<b>Treatments*</b>	POP	348 (27%)	0.0000 (e)
	Back Slabs	219 (17%)	
	NA External Fixator	210 (16.3%)	
	Skin Traction	125 (9.66%)	
	Skeletal Traction	155 (12%)	
	Polysling	10 (.8%)	
	Crape Bandage Only	30 (2.33%)	
	K-Wire	94 (7.33%)	
	Open Reduction and Internal fixation	39 (3%)	
	DCP	61 (4.73%)	
	Tension band Wire	27 (2.09%)	
	Debridement	80 (6.2%)	

*a = males are more significant b = RTA are most significant mode of trauma c = fractures of Tibia, Femur, Radius and Ulna are significantly involved in*

*this study*

*d = close fractures are significant among fracture type*

*e = According to the treatment the application of POP, Back Slab and NA external fixator was statistically significant.*

*\* Number of treatment exceeds the total number (1289) due to the multiple treatments for patients.*

presented in their 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> decade of life that is quite similar to the local studies and international data available.<sup>16,17</sup>

In our study the males are three times more prevalent as compared to female which is different when compared with the international data, as they have either the same occurrence of male to female or have an insignificant difference. In this study 99% people presented with fractures and 1% with dislocations and MST disorders which are much higher than the other studies.<sup>18</sup> Road traffic accident is leading cause of MST world wide. In the present study 51.66% patients were victim of road accident which is almost equivalent to the reported literature.<sup>18,9,10</sup>

The prevalence of sports and work related trauma was 30% of all traumas. This fact is surprising, because we can assume that the people in Pakistan play and work without professional supervision. The other reason of sports injuries may be aggression in adults during games. The lesser frequency of sports and work related injuries has been reported by the other researchers.<sup>11,12</sup> Moreover the domestic traumas were occurred mostly at home that is also shown by Sterling D, et al.<sup>19</sup>

Procedures done in emergency include simple analgesic upto open reduction and internal fixation per required. POP was applied to maximum patients. In our setup closed reduction and application of POP cast or pin plaster is more, POP cast is more suitable treatment modality in the management of closed and type-1 open fractures of tibia and fibula shaft because it is cheap, easily available, easy to apply, require less time and instrumentation as compared to other fixation systems. Although latest literature published in West, promotes closed intramedullary remained nails with interlocking or non-reamed intramedullary nails with interlocking with in six hours of injury. In our setup it is not

feasible due to its unavailability, cost and requires sophisticated instrumentation and can not be done within six hours due to lack of proper facility in our hospital emergency and late presentation of the patients.<sup>20</sup> In addition, in our study it is less than the other reported study done at Mayo Hospital, Lahore (39%) and in Jinah Hospital Lahore (40%).<sup>18,21</sup>

The application of black Back Slab is more as compared to previous studies. In previous studies the use of Naseer Awais External Fixator (NA Ext Fix) at Mayo Hospital, Lahore was 7.1% and at Jinah Hospital it was 0.9% but in this study its application was 16.33%. Furthermore the management of femur fracture caused by firearm, distal comminuted radial fractures and other open fractures were done by Naseer Awais External Fixator (NA Ext Fix). The application of skeletal traction (12%) and skin traction was less in this study (9.66%) as compared to study done in the same setting during 2001 which was 21% and 13.5% respectively. More over according to our experience, open fractures can be managed by using NA fixator as definitive treatment with good results and less complication.<sup>21</sup> Lastly, in this study the average cost of acute care is Rs. 1180.50 / patient. In similar studies conducted in Germany the average cost was \$ 1130 and Hong Kong it is about \$ 500. In Pakistan it has been reported the average cost is Rs. 1500 per patients but in this study it is less than the other.<sup>18,21</sup>

### Conclusion

The people of productive ages are more victim of Musculoskeletal Trauma. The major cause of trauma is road traffic accidents followed by sports/works and violence. According to the management most of the patients were treated and discharged, a few were admitted to the ward for further treatment. The most widely used procedures were application of POP, Back Slabs and fixation with NA external fixator. The average cost is Rs. 1180.50/patients.

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