

The cost of care in maxillofacial fractures treatment in relation to the type of fixation and length of stay at a tertiary care hospital of Karachi, Pakistan: A retrospective chart review

Humayun Kaleem Siddiqui, Kanza Ghauri, Farhan Raza Khan

Abstract

In addition to the clinical burden of trauma, the financial burden is an important aspect of care globally, especially for patients in low- and middle-income countries. The current retrospective review was done of data from January 2015 to December 2020 related to patients of oral maxillofacial trauma management in a tertiary care setting. Analysis of variance was used to determine the mean difference in the cost incurred depending upon the type of trauma and the number of bone plates used in fracture management. Pearson correlation was applied to explore any correlation involving patient age, aetiology and type of fracture, number of bone plates employed and the length of stay in the hospital. No statistically significant differences were noted in the cost among the different groups. The cost of care was significantly ($p < 0.001$) correlated to the length of stay. Other variables, such as the type of fractures and the number of plates, had no significant impact ($p > 0.05$).

Keywords: Oral maxillofacial trauma, Cost of care, Bone plating, Financial impact of surgery.

DOI: <https://doi.org/10.47391/JPMA.10890>

Introduction

Trauma is one of the leading causes of mortality globally. On average, trauma results in the loss of significantly more life years than cancer and heart diseases combined. In the United States, approximately 3 million facial injuries are treated annually.¹ In 2008, more than 21,000 hospitalisations and nearly 1.06 billion US dollars (USD) were spent on the management and care of orofacial trauma. All hospitalisations are known to impact the community significantly, burdening finances and lost days from educational institutions and work.²

The majority of facial trauma cases result from vehicle

Department of Surgery, Aga Khan University Hospital, Karachi, Pakistan.

Correspondence: Humayun Kaleem Siddiqui. e-mail: humayunmxfx@gmail.com

ORCID ID: 0000-0002-7542-4807

Submission complete: 26-09-2023

Review began: 03-12-2023

Acceptance: 18-05-2024

Review end: 13-03-2024

accidents, followed by falls and other injuries. Studies from various countries, including the US, Nigeria and Libya, as well as Europe showed that one of the most common causes of facial fractures were traffic accidents.³ Several studies have indicated that assault might be the most significant cause of these fractures⁴ but this factor (RTA) continues to pre-dominate in developing countries. The World Health Organisation has stated that such injuries will supersede infectious diseases as the major cause of death worldwide.⁵

Recently, several oral maxillofacial trauma units have started working on improving the efficiency of care by exploring the possibilities of decreasing the overall treatment expenditure. A comparison was made between the average total expenditure, operating costs and the range of expenses incurred during hospitalisation of facial trauma cases. A wide-scale comparison of all the causes related to outcome, demographic data and the individual and overall hospital costs between 2019 and 2021 recognised the gradient in the clinical and financial aspects of maxillofacial trauma treatment (MFT).⁶

Patients having experienced maxillofacial trauma often undergo long-term disabilities and prolonged treatment. As such, a clearer insight into the cost involved is imperative to assess the socioeconomic burden of the cost of care on the community and society.

The current study was planned to assess the cost of treatment, including operation and hospital care, in oral maxillofacial trauma cases, and to explore any correlation of the cost with the age of patient, aetiology and type of fracture, number of bone plates used, and the length of stay (LOS) in hospital.

Methods and Results

The retrospective study was conducted at the Aga Khan University Hospital, Karachi, and comprised patient data from January 2015 to December 2020, which was retrieved after approval from the institutional ethics review committee. The data retrieved from the hospital medical records related to for patients who had been admitted for oral maxillofacial trauma management. Financial records

Table-1: Distribution of patients with bone plating or conservative management along with the cost incurred.

Number of bone plates used	n (%)	Cost in in PKR* Mean±SD	Cost in in USD** Mean±SD	p-value
0	28 (18.9)	665,762±58,076	2219.2±193.5	0.69
1	102 (68.9)	712,661±58,602	2375.5±195.3	
2	10 (6.8)	780,039±38,540	2600.1±128.4	
3	8 (5.4)	770,138±43,483	2567.1±144.9	
Total	148 (100)	711,448±56,295	2371.5±187.6	

*Cost rounded off to rupee; **Conversion rate 1USD = 300 PKR.; PKR: Pakistani rupee, USD: United States dollar, SD: Standard deviation

Table-2: Distribution of patients with bone plating or conservative management along with the cost incurred.

Variable	Correlation magnitude	p-value
Age of the subject	0.142	0.08
Aetiology of fracture	0.003	0.97
Classification of fracture	0.168	0.04
Number of bone plates used	0.051	0.53
Length of stay	0.853	<0.001

of the patients who met the inclusion criteria were also retrieved from the database of the relevant department. Data of patients who had sustained only soft tissue injuries was excluded. Similarly, polytrauma cases, where neurosurgery or orthopaedics care was the focus of care, and maxillofacial management was planned to be deferred were also excluded.

For cost analysis, direct medical costs included payments made to the hospital for providing the desired medical treatment, overhead costs, laboratory and department overheads, and some other miscellaneous costs. The final cost was also inclusive of the cost of bone plating employed in patients who had undergone open reduction and internal fixation (ORIF).

Of the 148 patients included, 102(68.9%) had only one bone plate placed, and 28 (18.9%) were managed conservatively using mandibulo-maxillary fixation without any bone plates. The mean cost incurred was Pakistani rupee (PKR) 711,448±56,295, or USD 2371.5±187.6. There was no statistically significant difference in the cost for patients treated with varying number of bone plates (Table 1).

The cost of treatment was significantly correlated with LOS ($p<0.001$) (Table 2).

Discussion

Epidemiological surveys have indicated that the incidence and causes of maxillofacial fractures tend to vary with the socioeconomic status, geographical reason, religion, culture and era.⁷ The present study comprised records of 148 patients, indicating that the number of plates, patient age, and the aetiology or classification of the fracture did

not have any significant correlation with the total cost incurred with respect to patients admitted for facial fractures. However, LOS had a significant impact on the expenditure regardless of the management strategy; either conservative or bone plating.

The United Nations announced the Decade of Action for Road Safety 2011-2020. Research done by the World Health Organisation (WHO) suggested that middle-income countries contributed the highest to fatality rate compared to low-income and high-income countries. In Malaysia, road traffic accidents were found to be the fourth highest contributing factor to death (8.03%) and the seventh highest cause of hospital admission (4.85%).⁸

Over the last couple of decades, bone plate osteosynthesis has gained significant popularity for addressing maxillofacial fractures. Surgeons favour this approach due to its ability to achieve stable and precise anatomical realignment of bone fragments. It enables swift functional recovery without the need for mandibulo-maxillary fixation, accelerates bone healing, and reduces overall recovery time. However, despite the clear benefits associated with open reduction and rigid internal fixation for maxillofacial fractures, this approach has not gained widespread acceptance in most developing nations primarily due to financial constraints. Studies from Nigeria have confirmed the successful outcomes achieved through straightforward conservative techniques involving closed reduction and mandibulo-maxillary fixation.⁹ A study documented significantly reduced expenses when employing closed reduction and mandibulo-maxillary fixation compared to the open reduction along with rigid internal fixation.¹⁰

It is clear that reducing LOS and early return to work minimise patient's dependency, and lead to a positive outcome. Contrary to the popular belief in the specific treatment of a particular trauma patient, the overall in-patient services cost more than the actual management. In order to reduce LOS in maxillofacial cases, early operability, mobilisation and return to chewing function greatly enhance patient wellbeing.^{11,12}

The current study has limitations as it was carried out at a single centre and focussed on the financial aspect of costs incurred since the time of admission till the time the patient was discharged, excluding other costs from the time of trauma, pre-hospital management to treatment completion and rehabilitation. The additional data would have given a better insight for effective future planning.

Conclusions

The cost of the treatment of maxillofacial fractures in a private university hospital was found to mainly depend on LOS. The number of bone plates used, and other variables did not significantly impact the cost of care.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

References

1. National Institutes of Health. Fact Sheet—Burns and Traumatic Injury. [Online] 2011 [Cited 2022 February 21]. Available from URL: http://www.nigms.nih.gov/Education/Factsheet_BurnsTrauma.htm.
2. Gassner R, Tuli T, Hächl O, Rudisch A, Ulmer H. Cranio-maxillofacial trauma: a 10 year review of 9,543 cases with 21,067 injuries. *J Craniomaxillofac Surg* 2003;31:51-61. doi: 10.1016/s1010-5182(02)00168-3.
3. Nalliah RP, Allareddy V, Kim MK, Venugopalan SR, Gajendrareddy P, Allareddy V. Economics of facial fracture reductions in the United States over 12 months. *Dent Traumatol* 2013;29:115-20. doi: 10.1111/j.1600-9657.2012.01137.x.
4. Eggensperger N, Smolka K, Scheidegger B, Zimmermann H, Iizuka T. A 3-year survey of assault-related maxillofacial fractures in central Switzerland. *J Craniomaxillofac Surg* 2007;35:161-7. doi: 10.1016/j.jcms.2007.01.002.
5. Moncrieff NJ, Qureshi C, Deva AK. A comparative cost analysis of maxillofacial trauma in Australia. *J Craniofac Surg* 2004;15:686-91. doi: 10.1097/00001665-200407000-00030.
6. Brown RD, Cowpe JG. Patterns of maxillofacial trauma in two different cultures. A comparison between Riyadh and Tayside. *J R Coll Surg Edinb* 1985;30:299-302.
7. McCusker SB, Schmalbach CE. The otolaryngologist's cost in treating facial trauma: American Academy of Otolaryngology—Head and Neck Surgery survey. *Otolaryngol Head Neck Surg* 2012;146:366-71. doi: 10.1177/0194599811429007.
8. Yokoyama T, Motozawa Y, Sasaki T, Hitosugi M. A retrospective analysis of oral and maxillofacial injuries in motor vehicle accidents. *J Oral Maxillofac Surg* 2006;64:1731-5. doi: 10.1016/j.joms.2005.11.104.
9. Aksoy E, Unlü E, Sensöz O. A retrospective study on epidemiology and treatment of maxillofacial fractures. *J Craniofac Surg* 2002;13:772-5. doi: 10.1097/00001665-200211000-00012.
10. Afzelius LE, Rosén C. Facial fractures. A review of 368 cases. *Int J Oral Surg* 1980;9:25-32. doi: 10.1016/s0300-9785(80)80003-2.
11. Siddiqui HK, Aijaz A, Khan FR. Association between type of fixation and a length of stay amongst maxillofacial fracture patients: A retrospective charts review. *J Pak Med Assoc* 2022;72:2077-79. doi: 10.47391/JPMA.3177.
12. Abubaker AO, Lynam GT. Changes in charges and costs associated with hospitalization of patients with mandibular fractures between 1991 and 1993. *J Oral Maxillofac Surg* 1998;56:161-8. doi: 10.1016/s0278-2391(98)90858-8.

Author Contribution:

HKS: Concept, writing and final approval.

KG: Literature search and drafting.

FRK: Finalizing of manuscript.