The Cost and Inpatient Burden of Treating Mandible Fractures: A Nationwide Inpatient Sample Database Analysis

Israel Pena Jr, MD; W. Marshall Guy, MD; Jose P. Zevallos, MD
Bobby R. Alford Department of Otolaryngology-Head and Neck Surgery, Baylor College of Medicine, Houston, Texas.

Abstract

Objective: At the conclusion of this presentation, the participants should be able to discuss the patient demographics, hospitalization characteristics, and costs associated with the treatment of mandible fractures.

Methods: A retrospective cross-sectional analysis was conducted by analyzing the 2009 Nationwide Inpatient Sample (NIS) database for patients with isolated mandible fractures.

Results: 1481 patients were identified with isolated mandible fractures. The average age of patients was 32 and 85.4% were male. Thirty-nine percent were Caucasian, 25% African-American, 12% Hispanic, 7% other, and 1% Asian. Twelve percent of patients presented with a history of alcohol abuse, 10.7% drug abuse, and 5.5% mental illness. Thirty-seven percent were from the lowest median household income quartile, and 77% were uninsured or had Medicaid. Eighty-two percent of patients were treated in academic institutions and 18% in private hospitals. Seventy-two percent of patients were treated at large hospitals (>100 beds), 24% in medium size hospitals (50-99 beds), and 4% in small hospitals (< 50 beds) with the majority of patients (95%) receiving treatment in an urban hospital setting. Thirty-eight percent of patients underwent ORIF within 24 hours of admission, the average length of stay (LOS) was 2.96 days, and average cost of hospitalization was $35,804. Increased LOS was associated with alcohol abuse (3.88 vs. 2.83 days, p < 0.001), drug abuse (3.98 vs. 2.84 days, p < 0.001), mental illness (3.00 vs. 2.00 days, p = 0.005), age greater than 40 years (3.68 vs. 2.71 days, p < 0.001), and treatment in a private rather than academic institution (3.17 vs. 2.91 days, p = 0.03). Increased total cost was associated with drug abuse ($34,283 vs. $26,844, p = 0.001), alcohol abuse ($43,991 vs. $34,675, p < 0.001), age over 40 ($38,768 vs. $34,781, p = 0.013), and undergoing surgery in the Northeast rather than the Midwest ($40,237 vs. $30,242, p < 0.05).

Conclusion: The reduction of mandible fractures indicates an extensive consumption of hospital resources, with uninsured African American males of low socioeconomic status comprising a disproportionately high percentage of patients treated nationally. Healthcare expenditures associated with the treatment of mandible fractures are higher for older patients and those with a history of mental illness or substance abuse. To improve outcomes and reduce hospital charges related to mandible fractures, outpatient resources and inpatient protocols should be implemented to address the factors we identified as contributing to higher costs and increased hospital stay.

Background

•Facial fracture reductions in the US contributes to an inpatient hospital cost of $1.06 billion
•Mandible fractures are the most common facial fracture in the US requiring operative repair and account for more than half of all hospitalization charges associated with facial fractures
•Mandible fractures are mostly common due to assault, followed by MVA and accidental falls
•A disproportionately high percentage of patients are African American
•Alcohol and drug abuse are commonly reported comorbidities
•Mandible fractures are mostly treated with open reduction internal fixation (ORIF)

Methods

•Retrospective cross-sectional analysis of 2009 Nationwide Inpatient Sample Database (NIS) for mandible fractures
•Inclusion criteria: mandible fracture defined by ICD-9 code 802.20-802.37 listed as diagnosis 1-10
•Exclusion criteria: patients diagnosed with concurrent poly-trauma (fracture outside the mandible), respiratory distress, or neurological injury
•Variables analyzed: 1)Patient demographics (age, gender, race, income level, insurance type) 2)Hospital characteristics (bed size, location, region, academic status) 3)Common co-morbidities (mental illness, substance abuse, alcohol use) 4)Fracture characteristics (number, location)
•Average cost of hospitalization and length of stay were calculated for the population at whole and for each individual variable
•Statistical analysis was performed by SigmaPlot v12.5 using paired 2 tailed t-tests and All Pairwise Multiple Comparison Procedures (Dunn's Method); to compare cost and length of stay for each variable evaluated

Results

•1481 patients met inclusion criteria
•Average overall cost of hospitalization was $35,804
•Average overall length of stay was 2.96 days
•Patient demographics: average age of 32, majority Caucasian (39%) or African American (25%), 61% earned less than 48k, 77% uninsured or covered by Medicaid
•Hospital characteristics: 72% treated at a large hospital (>100 beds), 95% in an urban setting, 82% at an academic institution, majority in the northeast (30%) or south (36%)
•Co-morbidities: 12% with history of alcohol abuse, 10.7% with illicit drug use, 5.46% with concurrent mental illness
•Fracture characteristics: Angle was most common fracture type (36%), 95% had one or two mandible fractures, 38% of fractures reduced within 24hrs
•A significant increase of cost was associated with: age over 40 ($38,768 vs. $34,781, p = 0.013), hospitalization in the Northeast vs. Midwest ($36,999 vs. $26,225, p = 0.03), illicit drug use ($34,283 vs. $26,844, p = 0.001), and a history of alcohol abuse ($43,991 vs. $34,675, p = 0.001)
•A significant increase in length of stay was associated with: age over 40 (3.68 vs. 2.71, p = 0.03), treatment at a non-academic institution (3.17 vs. 2.91 days, p = 0.03), alcohol abuse (3.98 vs. 2.84 days, p < 0.001), mental illness (3.00 vs. 2.00 days, p = 0.005), and drug abuse (3.98 vs. 2.84 days, p < 0.001)

Discussion

•Mandible fractures were found to incur a significant burden in healthcare dollars with an average cost of $35,804 per hospitalization
•Our results supported the hypothesis that multiple variables are associated with a significant increase in cost and length of stay
•Uninsured males of low socioeconomic status comprise the greatest percentage of patients
•Elderly patients (>40) accrue significantly higher costs and longer LOS, thus emphasis should be placed on treating elderly patients efficiently
•Hospitals in the Northeast had a higher cost but equivalent LOS to hospitals in the Midwest, indicating a need for standardization of procedures and costs amongst hospitals nationwide
•Academic institutions were found to have higher turnover but, though not significant, increased costs. Protocols to standardize hospitalization days in non-academic institutions are warranted
•Recognizing patients with comorbidities such as alcohol and drug use and establishing interventions for these patients can help to alleviate the increased costs associated with alcohol and drug use
•Strengths: large (1481), comprehensive, nationwide sample from one whole year was analyzed
•Limitations: itemized billing costs were unavailable therefore only associations and not direct causal relationships could be determined; surgical complications were unable to be analyzed

Conclusion

With an average hospitalization cost of $35,804 per person, the reduction of mandible fractures indicates an extensive consumption of hospital resources. Uninsured African American males of low socioeconomic status comprise a disproportionately high percentage of mandible fracture patients treated nationally. Healthcare expenditures associated with the treatment of mandible fractures are higher for patients over age 40 and those with a history of mental illness or substance abuse. To improve outcomes and reduce hospital charges related to mandible fractures, outpatient resources and inpatient protocols should be implemented to address these factors.

References