



Establishing Standard Performance Measures in Adult Traumatic Brain Injury Patients: A Nationwide Inpatient Sample Database Study

Brian M Corliss; Kristopher G Hooten MD; Sarah Shireen Gul MD; Dan Neal MS; Gregory J. Murad MD; Maryam Rahman MD

MS

University of Florida, Department of Neurological Surgery, Gainesville, FL, USA



Introduction

The Agency for Healthcare Research and Quality (AHRQ) patient safety indicators (PSIs) and Centers for Medicare and Medicaid Services hospital-acquired conditions (HACs) are publicly reported metrics, which illustrate the overall quality of care of an institution. The incidences of PSIs and HACs in traumatic brain injury (TBI) patients were determined using the nationwide inpatient sample (NIS) database.

Methods

The NIS database was queried for patients admitted with ICD-9 diagnosis codes consistent with TBI. The incidences of PSIs and HACs were determined for TBI patients and compared between teaching and non-teaching hospitals. A logistic regression model was created to estimate the effects of insurance status on PSIs, HACs, and patient outcomes.

Table 1: ICD-9 TBI diagnosis and procedure codes

Diagnosis Code	Procedure Code
800.0-800.99: Fracture of vault of skull	01.10: Intracranial pressure monitoring
801.00-801.99: Fracture of base of skull	01.16: Intracranial oxygen monitoring
803.00-803.99: Other and unqualified fractures of the skull	01.24: Other craniotomy (including cranial decompression, or removal of epidural hematoma or foreign body)
804.00-804.99: Multiple fractures involving the skull or face with other bones	01.59: Other excision or destruction of lesion or tissue of brain (including debridement of brain)
850.0-850.9: Concussion	02.02: Elevation of skull fracture fragments
851.00-851.99: Cerebral laceration and contusion	02.03: Formation of cranial bone flap
852.00-852.99: Subarachnoid, subdural, or extradural hemorrhage following injury	02.21: Insertion of external ventricular drain
853.00-853.19: Other and unspecified intracranial hemorrhage following injury	
854.00-854.19: Intracranial injury of other and unspecified nature	

Factors affecting incidences of PSIs and HACs

	Total PSI	Pt suffering at least one PSI	Total HAC s	Pt suffering at least one HAC
Primary payer	NS	NS	54.8% more per pt among Medicaid pts (p=0.012)	Medicaid pts with OR 1.6, p=0.004
Teaching status	14.8% fewer per pt in non-teaching hospitals, p<0.001	Non teaching hospital with OR=0.72, p<0.001	NS	NS
Age	0.1% increase per pt for each yr of age, p=0.048	NS	NS	NS
Gender	4.6% more per pt among males, p=0.022	NS	NS	NS
CM score	22.4% more per pt for each unit increase, p<0.0001	OR multiplies by 1.7 for each unit increase, p<0.0001	51.9% increase for each unit increase, p<0.0001	OR multiplies by 1.5 for each unit increase, p<0.0001

Learning Objectives

To be able to cite relevant statistics related to in-hospital patient safety and iatrogenic complications in TBI patients. To be able to identify patient and healthcare systems factors related to increased PSI and HAC in hospitalized TBI patients.

Results

There were 15,403 total PSIs amongst 24,012 TBI patients. Teaching hospitals had a higher incidence of PSIs (653 per 1000 patients) compared to non-teaching hospital (615 per 1000 patients; p=0.0016) as well as a higher fraction of patients suffering at least one PSI (54.0% vs 50.8%; p = 0.004.) There were only 165 HACs amongst 24,012 TBI patients. There was no significant difference between teaching and non-teaching hospitals in incidence of HACs; HACs were more common, however, in Medicaid patients compared to privately insured patients (8.9 vs 5.0 HACs/1000 patients; p = 0.0015.) Multivariate analyses comparing the Medicaid and private insurance patients demonstrated no difference between the groups in either poor outcome or mortality, however, the length of stay for Medicaid patients was prolonged 2.0 days compared with private insurance (95% CI [1.35, 2.62]; p<0.0001.) Other factors that affected overall rates of PSIs included age, gender and comorbidity scores (see table.) Factors affecting incidence of HACs included primary payer and comorbidity score (see table.)

Conclusions

Clinical outcomes following TBI were not affected by insurance status. Factors that were shown to increase overall incidence of PSIs or HACs included teaching hospital status, male gender, increasing age, primary payer status, and increasing comorbidity scores. These data may be used as reference values for hospitals reporting their own rates and seeking to improve the quality of care they provide for TBI patients.

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