



Neurosurgical Procedures in Traumatic Brain Injury in the United States: 2002-2011

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Learning Objectives

By the conclusion of this session, participants should be able to:

- 1)To quantify the aspects of the neurosurgical management of traumatic brain injury in the United States.
- 2)To describe current trends and changes in neurosurgical interventions for traumatic brain injury.
- 3)To identify patient and injury level factors associated with neurosurgical intervention in patients with traumatic brain injury.

Introduction

Traumatic brain injuries (TBI) are a significant cause of morbidity and mortality sometimes requiring neurosurgical intervention. We sought to describe the epidemiology of TBI-related neurosurgical intervention (NSI) in the United States.

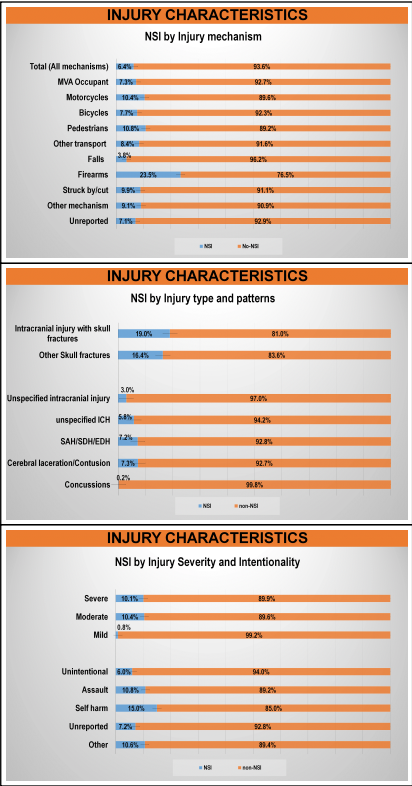
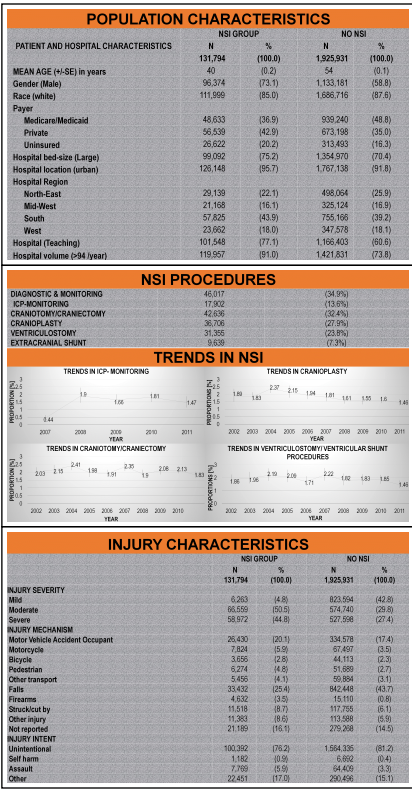
Methods

Using the Nationwide Inpatient Sample (2002-2011), all patients admitted with TBI were isolated and patients undergoing specific neurosurgical interventions (NSI) were identified. The Abbreviated Injury Scale classified (AIS) into mild (AIS<=2), moderate (AIS=3), and severe (AIS>=4). NSI procedures examined included: intracranial pressure (ICP) monitor placement, craniectomy/craniotomy, cranioplasty, ventriculostomy, and ventricular shunt placement.

Results

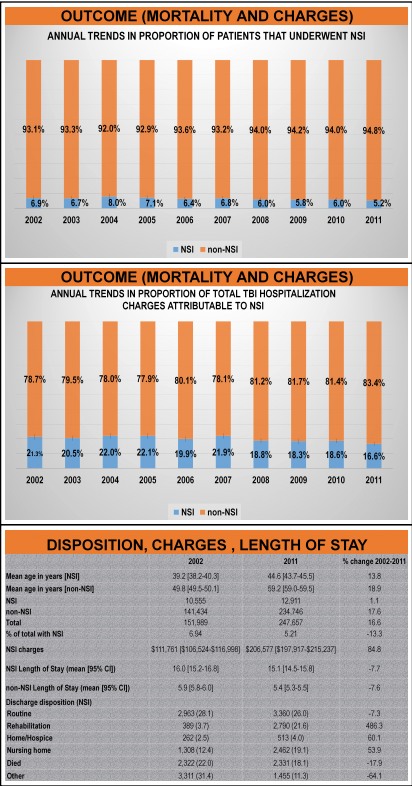
Among 2,057,726 patients admitted for TBI, NSI occurred in 6.4%, of whom 73.1% were male and 79.8% had insurance coverage. Patients undergoing NSI were younger than non-NSI patients (mean age 40.4 (SE 0.52) vs. 53.5 (SE 0.46) years, $p<0.001$).

Most patients undergoing NSI were treated at teaching hospitals (77.1%) and in urban centers (95.7%) (both $p<0.001$), and had moderate (50.5%) or severe (44.8%) TBI.



Results (Ctd)

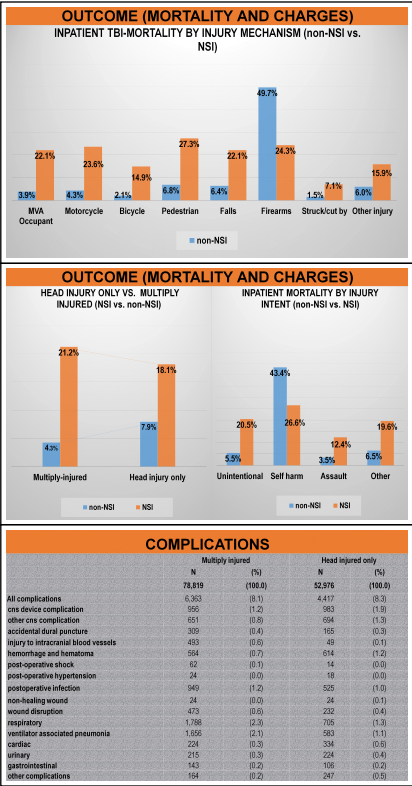
Diagnostic and monitoring procedures accounted for 34.9% of all NSI, followed by craniotomy/craniectomy (32.4%), cranioplasty (27.9%), ventriculostomy (23.8%) and ventricular shunt procedures (7.3%). Firearm injuries most frequently required NSI (23.3%) compared with pedestrian-injuries (10.8%) and motorcycle injuries (10.4%) ($p<0.001$). The proportion of TBI cases involving NSI decreased from 6.9% in 2002 to 5.2% in 2011 ($p<0.001$).



Results (Ctd)

Intracranial Pressure (ICP) monitors were placed in 0.44% of patients in 2007 vs. 1.47% in 2011 while the proportion of patients undergoing craniectomy/craniotomy declined slightly from 2.03% in 2002 to 1.83% in 2011 (both $p<0.001$).

On average, patients undergoing NSI were hospitalized longer than non-NSI patients [16.4days (95% CI 15.7; 17.0)] vs. [5.8days 95% CI 5.6; 5.9)].



Conclusions

Younger patients and those with more severe TBI were more likely to undergo NSI, with a substantial increase in ICP monitor placements and corresponding decline in craniectomies/craniotomies. Not surprisingly, patients undergoing NSI required substantially longer inpatient care.

Key

NIS-Nationwide Inpatient Sample; NSI-Neurosurgical Intervention; ICD-9 codes- International Classification of Diseases (9th Revision); CNS - Central Nervous System; 95% CI- 95% Confidence Interval; IQR- Interquartile Range