Applicability of the Brain Injury Guidelines on patients transferred to a level 1 trauma center with traumatic brain injury

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Introduction

In the United States, an estimated 2.5 million people sustain traumatic brain injuries (TBIs) every year. These injuries can be life-threatening and may require neurosurgical intervention, a service which is not found at many healthcare facilities.

The Brain Injury Guidelines (BIG)[1] outline recommendations for patients with TBIs who can be medically managed safely without repeat imaging or neurosurgical consultation.

The BIG do not include patients with a TBI who arrive as a transfer from another hospital; thus, this study explores whether or not the BIG can be safely applied to this population. .

Methods

- This study is a single-center retrospective chart review comparing outcomes of trauma patients with a blunt-force TBI seen in the emergency department arriving as a transfer from another healthcare facility versus non-transfer.
- The charts reviewed were from January 1st, 2017 through June, 2023. The included charts were from patients admitted to Our Lady of the Lake Regional Medical Center in Baton Rouge, Louisiana with a TBI.
- The primary outcomes of this study were mortality, progression on repeat head CT, progression on head CT with neurologic deterioration, and new management as a result of repeat head CT.
- The secondary outcomes of the study were intensive care unit length of stay and hospital length of stay.
- A p value of <0.05 was considered significant
- Wilcoxon rank sum test, Fisher's exact test, and Pearson's Chi-squared test were used for group comparisons
- Multivariable logistic regression was used to determine predictors of mortality

Patient Characteristics

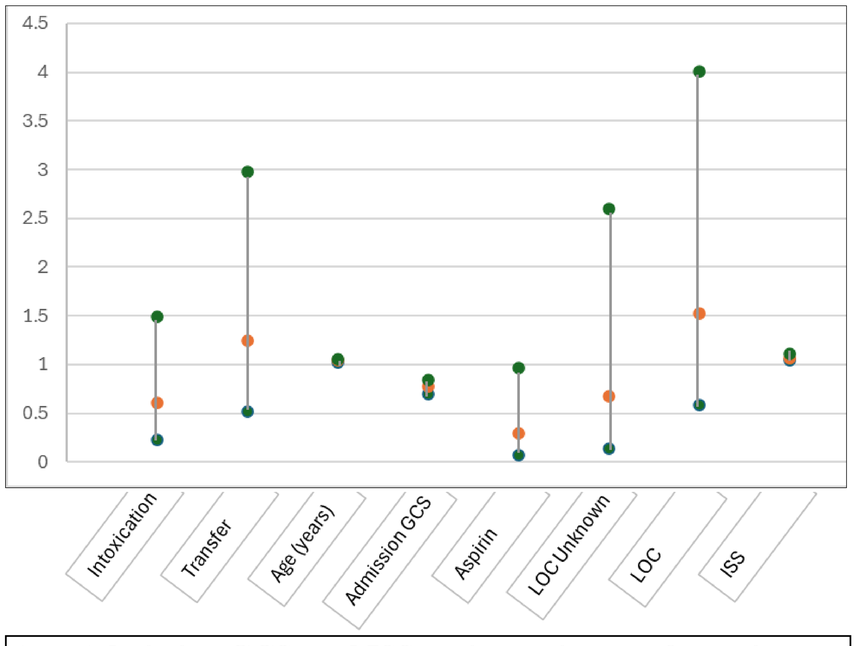
Characteristic	Overall N = 516[1]	Transfer N = 217[1]	No transfer N = 299[1]	p-value[2]
Age (years)	63.00 (41.50, 78.00)	68.00 (52.00, 79.00)	59.00 (36.00, 77.00)	<0.001
Sex				>0.9
Female	192 (37%)	81 (37%)	111 (37%)	
Male	324 (63%)	136 (63%)	188 (63%)	
MOI				
MVC	98 (19%)	23 (11%)	75 (25%)	
MCC	14 (2.7%)	2 (0.9%)	12 (4.0%)	
ATV	3 (0.6%)	1 (0.5%)	2 (0.7%)	
Fall	304 (59%)	163 (75%)	141 (47%)	
Ped vs auto	31 (6.0%)	2 (0.9%)	29 (9.7%)	
Other	66 (13%)	26 (12%)	40 (13%)	
Admission GCS	15.00 (14.00, 15.00)	15.00 (14.00, 15.00)	15.00 (13.00, 15.00)	<0.001
Admission systolic BP	136.00 (120.00, 155.50)	136.00 (122.00, 155.00)	135.00 (117.00, 156.00)	0.8
Admission Pulse	85.00 (73.00, 98.00)	84.00 (73.00, 94.50)	87.00 (73.00, 102.00)	0.047
+ EtOH	135 (26%)	29 (13%)	106 (35%)	<0.001
Abnormal pupillary exam	62 (12%)	9 (4.1%)	53 (18%)	<0.001
Abnormal Focal Neurologic Exam	41 (7.9%)	12 (5.5%)	29 (9.7%)	0.084
Loss of Consciousness				<0.001
No	224 (43%)	115 (53%)	109 (36%)	
Unknown	62 (12%)	24 (11%)	38 (13%)	
Yes	230 (45%)	78 (36%)	152 (51%)	
ISS [Injury severity score]	12.00 (9.00, 21.00)	10.00 (9.00, 17.00)	14.00 (9.00, 25.00)	0.005
Home Aspirin	88 (17%)	49 (23%)	39 (13%)	0.004
Home Clopidogrel	41 (7.9%)	23 (11%)	18 (6.0%)	0.058
Home Ibuprofen	6 (1.2%)	2 (0.9%)	4 (1.3%)	>0.9
Home Anticoagulants	70 (14%)	32 (15%)	38 (13%)	0.5
First Head CT in the ED	348 (68%)	54 (25%)	294 (99%)	<0.001

[1]Median (Q1, Q3); n (%)

[2]Wilcoxon rank sum test; Fisher's exact test; Pearson's Chi-squared test

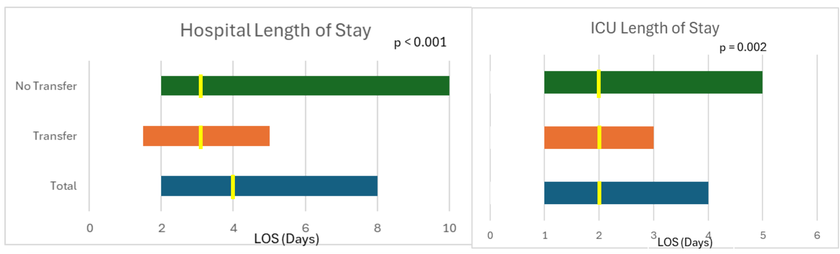
Excluded charts were those with a penetrating mechanism of injury, under the age of 18 years old, pregnant individuals, and prisoners.

Adjusted OR for Mortality

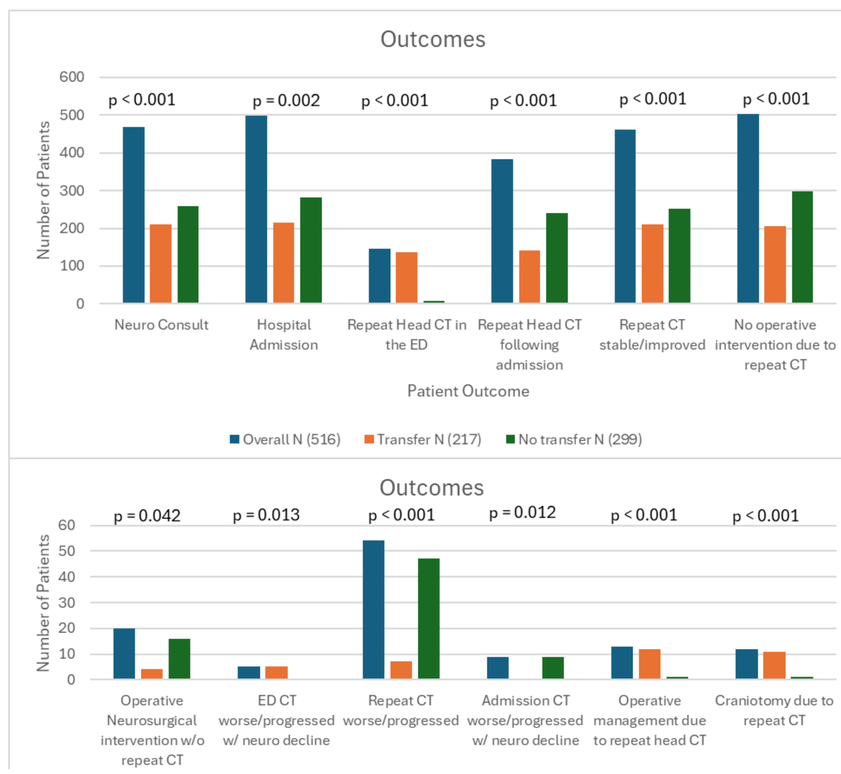


Age, Admission GCS, and ISS variances in transfer patients all are statistically significant with p < 0.001. Orange dots represent OR, green dots and grey lines represent the 95% CI

Outcomes



Yellow lines represent median values, bars represent IQR



Fewer worse/progressed repeat CT in transfer patients.

Conclusions

Transfer patients with TBIs do not have a significantly different mortality rate or median hospital length of stay compared to non-transferred patients. Transfer patients also showed significantly fewer instances of worse/progressed repeat CTs and more frequent operative management due to repeat head CTs. This suggests BIG can be safely applied to TBI transfer patients.

References

1. Joseph B, et al. The BIG (brain injury guidelines) project: defining the management of traumatic brain injury by acute care surgeons. J Trauma Acute Care Surg. 2014;76:965-969.
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