Adoption of the Brain Injury Guidelines for management of traumatic brain injury at a community level II trauma center

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ABSTRACT

Traumatic brain injury (TBI), particularly when associated with intracranial hemorrhage (ICH), is a condition with increasing incidence and burden on health systems. Only in recent years have studies, such as the Brain Injury Guidelines (BIG), emerged that address goals of reducing unneeded specialist consultation, hospitalization, and ICU admissions, all of which have been associated with standard practice regardless of intracranial bleed type or severity. Despite BIG having been validated in multiple studies over the past decade, there is still delay among lower-volume institutions to adopt BIG. This project attempts to evaluate historical management of TBI at Northeast Georgia Medical Center (NGMC), a community level II trauma center, before recent implementation of BIG. Using preliminary 2019 NGMC trauma registry data and chart review, we determined relative frequencies of retroactively-assigned BIG categories for patients presenting to the trauma bay with TBI. Additionally, we were able to determine for each category the average: hospital length of stay, ICU length of stay, and number of head radiographs obtained. It is hoped this data analysis can be further extrapolated to include additional data before and after BIG implementation to validate BIG in a smaller community trauma center and to identify potential cost savings.

BACKGROUND

The incidence of TBI has risen significantly over the past decade with Centers for Disease Control data showing rates of TBI-related emergency department (ED) visits increasing for all age groups from 2001 to 2010.1 (Fig. 1) In 2014 TBI in the United States accounted for 2.2 million ED visits and 280,000 hospitalizations, and TBI costs the U.S. health system nearly $30 billion annually.2 This alarming data highlights the need to reduce TBI-related costs. This can be done through improved TBI characterization and utilization of qualified healthcare providers, such as acute care surgeons, to better triage patients with low-risk TBI categories known to be safely managed without reflexive specialist consultation, additional imaging, or transfer to facilities where specialists are available. The development of BIG in 2014 and subsequent studies validating its utility have helped in shifting the paradigm surrounding TBI management.3,4 (Table 2) These guidelines divide brain injuries into three categories based on elements from the patient’s history, clinical features, and radiographic features on initial CT that incorporate intracranial bleeding type and severity. Once the TBI is categorized, management can be tailored to the associated therapeutic plan for that category with specific recommendations concerning hospitalization, repeat head CT, and specialist consultation.

METHODS

The NGHS trauma data registry was used to access data for trauma patients who were diagnosed with TBI during 2019. To date, a total of 74 patients from this dataset of 315 patients have undergone retrospective chart review and have been retrospectively assigned a BIG category based on Table 2. Additionally, clinical outcome data points were recorded for each patient. These were averaged for each BIG category and specifically include: total hospital length of stay, ICU length of stay, and average number of head radiographs obtained. When acquiring this data, radiographs from non-NGHS facilities of patients transferred to NGMC were not incorporated, and patients with polytrauma potentially confounding their hospital length of stay were excluded. Additionally, data was not incorporated for patients less than 18 years of age and for patients transferred to another hospital from NGMC. If a patient did not require ICU stay, day patient was assigned an ICU length of stay value of zero, which was used in overall averages. After making these adjustments, there were a total of 46 patients included in this preliminary data analysis. Collected data points for each BIG category are listed in Table 3.

RESULTS

There are a few notable points of discussion from this preliminary data analysis, which so far, has only included 46 of potentially 315 trauma patients from 2019 at NGMC with TBI managed before BIG implementation:

• The findings that retroactively-assigned BIG 1 and 2 patients had average ICU lengths of stay of 0.71 and 1.00 days, respectively, suggests there were unneeded elevations of care for these BIG 1 and 2 patients.

• The finding that retroactively-assigned BIG 1 and 2 patients had average numbers of head radiographs of 2.43 and 1.73, respectively, suggests a significant number of unneeded head radiographs were taken for BIG 1 and 2 patients in both 2019 and 2020. These patients did not require imaging per BIG, and the above findings all suggest potentially significant cost savings from BIG implementation at NGMC by reducing unneeded hospitalizations, elevations of care, and head imaging.

FUTURE WORK

Much work is to be done analyzing the remainder of 2019 TBI data. Findings will be incorporated with data reported here, and future post-BIG-implementation TBI data will be continue to be collected via the trauma registry along with associated BIG category for each TBI admission. It is anticipated that this project will continue until sufficient is obtained to validate adoption of BIG at NGHS by looking for significant difference in the clinical outcomes reported here and by evaluating potential cost savings from potential differences in these clinical outcomes.

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REFERENCES


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