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Do contradictions in TQIP measures affect perceptions of quality. An analysis of TQIP definitions on quality outcomes for placement of ICP monitoring at a single level one trauma center

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ABSTRACT

Background: TQIP quality measures as currently defined on occasion provide discordant conclusions. A recent TQIP report of an urban level one-trauma center suggested a low employment of ICP monitoring while also demonstrating aggressive implementation of ICP monitoring (ave. within 90 min of arrival). This apparent contradiction leads to the question; Does TQIP define correctly the patient cohort who would most benefit from ICP monitoring?

Methods: A retrospective IRB approved review of all patients reported to TQIP with severe TBI was performed at an ACS verified level one trauma center. All patients admitted to the TS during the TQIP study period were reviewed. Demographic data as well as AIS, ISS, GCS, injury type and outcomes were reviewed. Data were reported as aggregate.

Results: Trauma registry review determined 108 patients met the TQIP definition for severe TBI. Analysis of these patients revealed only 58%(63) met clinical criteria for severe TBI. In this group 45.4%(49) suffered non-survivable TBI. ICP monitoring was not initiated in this subgroup of patients. 42%(45) of the patients were determined to have mild to moderate TBI. In this cohort the initial GCS reported in the trauma registry overestimated the severity of the TBI in 19.4%(21) of the patients. ICP monitoring was initiated 29%(30) patients. The analysis would indicate 13%(14) would have benefited from ICP monitoring indicating an 15%(16) over utilization. The majority of these patients sustained meaningful neurologic recovery indicating a better-defined criterion may be necessary to determine when ICP monitoring is a quality indicator.

Conclusion: This study indicates the current TQIP definition used to justify ICP monitoring appears to overestimate the number of patients who would benefit from ICP monitoring. The corrected quality analysis indicates an overutilization rather than an underutilization of ICP monitoring. Further study of the effect of definitions on quality measures should be considered.

Introduction

The Trauma Quality Improvement Program or TQIP was rolled out in 2008 by the American College of Surgeons Committee on Trauma (ACS/COT).[1] The aim of TQIP is to provide risk-adjusted data for the purpose of reducing variability in adult trauma outcomes and offering best practice guidelines to improve trauma care.[1,2] TQIP makes use of national data to allow hospitals to objectively evaluate their trauma centers' performance relative to other hospitals of similar size and level of expertise. Level one centers are compared to level one centers, level two centers with level two centers, and most recently level three centers have been added to the evaluations. The functional use of TQIP evaluations is now being required by the verification arm of the ACS/COT as an integral part of all trauma programs. This review process has led to TQIP reports becoming an integral part of the peer review process and the multiple disciplinary trauma committees of ACS/COT verified trauma centers.

In order to assure quality data collection TQIP attempts to addresses this issue by addressing certain care metrics, such as

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monitoring intracranial pressure (ICP) in patients with traumatic brain injuries, measuring time to operations, measuring the placement and timing of tracheostomies, measuring the time to hemorrhage control, and documenting the use of venous thromboembolism prophylaxis.[1–3] As a part this type of evaluation the TQIP analysis indicated our level one trauma center was an outlier with the number of ICP monitors placed appearing to be much less that other institutions. We also noted that our mean time to ICP placement (90 min) was much lower than other level one trauma centers putting us in the first quartile for ICP placement but the fourth quartile for the number of ICP monitors placed. This discordance led to our current study. The purpose of this study was to understand if the definition for requirement of ICP placement by TQIP correctly identified the cohort of patients which would most benefit from ICP monitoring.

Methods

A retrospective IRB approved review of all patients reported to TQIP with severe TBI was performed at an ACS verified level one trauma center for the time period of TQIP analysis (2016 first quarter data). All patients admitted to the TS during the TQIP study period were reviewed. Demographic data as well as AIS, Injury severity score (ISS), Glasgow Coma Scale (GCS), injury type and outcomes were reviewed. Data were reported as aggregate.

Results

Trauma registry review determined 108 patients met the TQIP definition for severe Traumatic Brain Injury (TBI). Analysis of these patients revealed only 58% (63) met clinical criteria for severe TBI. The average age in this group was 44.86. The male to female ration was 68% male to 32% female. Falls were the most common injury in 44% followed by MVC in 22% of the injured (Fig. 1). Penetrating injuries were seen in only 3% of the injuries (Fig. 1). We found that 45.4% (49) suffered non-survivable traumatic brain injuries. ICP monitoring was not initiated in this subgroup of patients which appears to have been an appropriate decision. The judgment of non-survivable head injury was made by the attending neurosurgeon based on the findings of the CT scan. We then discovered 42% (45) of the patients were determined to have mild to moderate TBI. In this cohort the initial GCS reported in the trauma registry overestimated the severity of the TBI in 19.4% (21) of the patients. This group of patients also did not require ICP monitoring and were able to be followed clinically. ICP monitoring was initiated 29% (30) patients. The analysis indicated 13% (14) would have benefited from ICP monitoring signifying an 15% (16) over utilization. The majority of these patients who had ICP monitoring sustained meaningful neurologic recovery. Twenty patients(66%) were able to be discharged to a rehabilitation unit and 10 patients (33%) where able to be discharged home with home health care. These findings indicate a better-defined criterion may be necessary to determine when ICP monitoring is a quality indicator.

Discussion

A number of challenges are present when current quality measures are used to evaluate the value of care provided at a trauma center. In this study one factor in the much larger array of measures of clinical quality can portray a program to be providing poor care when in fact with deeper analysis the program is providing appropriate care.[3–6]

The indications for an ICP monitor remain debated in several circumstances, including (a) comatose patients with an initial normal CT scan or only minimal findings, e.g., traumatic subarachnoid hemorrhage (SAH); (b) diffuse axonal injury (DAI); (c) bifrontal contusions in the non-comatose patient; and (d) following surgery such as a decompressive craniectomy or evacuation of a mass lesion. These indications were addressed in a recent consensus conference on ICP.[7] The recent consensus conference concluded that first, invasive ICP monitoring is not recommended in comatose patients with an initial normal CT scan or only minor changes, e.g., small petechiae, particularly if the scan is obtained early after injury. These patients should undergo a follow-up CT scan, particularly if there is neurologic worsening, and receive an ICP monitor if there is disease progression on the CT scan. Second, an ICP monitor is indicated when the CT shows evidence of brain swelling, e.g., compressed or absent basal cisterns. Third, an ICP monitor may be considered in patients with large bifrontal contusions independent of the neurological condition. Fourth, an ICP monitor is recommended when sedation interruption to check neurological function may be dangerous, e.g., respiratory failure.

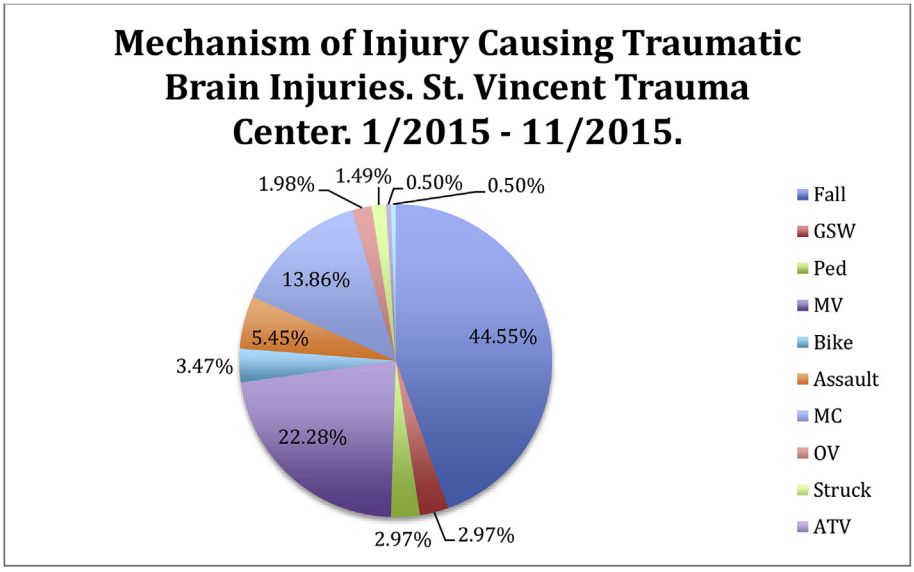

Fig. 1. Mechanism TBI.

Similarly, an ICP monitor is useful when the neurological examination is not reliable, e.g., maxillofacial trauma or spinal cord injury. Fifth, elevated ICP may occur after a decompressive craniectomy performed in a delayed fashion for intracranial hypertension refractory to medical management. ICP monitoring is recommended in these patients. Finally, intracranial hypertension is common in patients who undergo a craniotomy for a mass lesion, particularly an acute subdural hematoma, and when present, intracranial hypertension aggravates outcome. Consequently, an ICP monitor is recommended after a craniotomy particularly when there are other associated factors, e.g., hypoxia, hypotension, pupil abnormalities, midline shift >5 mm, brain swelling at surgery, and when patients may require other surgeries for extracranial injuries. However, the role of an ICP monitor in patients whose bone flap is left out at this initial surgery is uncertain but may be clarified by the proposed RESCUE-acute subdural hematoma trial.[8–16]

In this study ICP monitoring appears to have been initiated quickly within 90 min of arrival on average following the guidelines who would benefit the most from ICP monitoring. Despite appropriate care for the patients who would benefit the most the TQIP definition was not granular enough to elucidate this fact. This is due to definition for ICP for evaluating ICP placement which is an abnormal CT scan and a GCS of less than 8. Although this definition would include those patients who might benefit from ICP placement the definition also gleans patients whose initial GCS is low for reasons other than a traumatic brain injury (TBI) and an abnormal CT and those patients with severe TBI and findings on CT which would indicate a non-survivable injury. The data from this study would suggest that the criteria used to evaluate prompt and valuable ICP monitoring might be altered to provide a more appropriate picture of the value of the care provided. For this particular indicator additional factures such as neurosurgical impression of survivability, and best GCS in the first 8 h post injury might be added to provide a more granular picture of the quality of care being provided.

This study does have several limitations. The study is of a single center which was found to be a TQIP outlier. The findings of this study may not be universally applicable due to the subjective nature of the CT scan readings. The study is also retrospective and suffers from the limitations and biases of all retrospective studies.

Conclusion

As medical care moves into a new paradigm where quality measures determine reimbursements the challenge to make sure that attributions of quality is recognized and is correctly accounted for remains an elusive goal. This study would indicate that continued process improvement of quality programs is necessary as efforts to make care quality driven continue.[8] The authors do believe however that the lessons from this study are widely applicable and centers who find themselves as outliers by quality programs should not despair but do the hard work necessary to justify appropriate care.

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