Local implementation and standardization of the Pediatric Severe Traumatic Brain Injury Guidelines

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Local implementation and standardization of the Pediatric Severe Traumatic Brain Injury Guidelines

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Introduction

Severe Traumatic Brain Injury (TBI)

• Leading cause morbidity and mortality in pediatric population

• Improved survival linked to adherence of clinical indicators derived from national guidelines [1]

• Standardization of care and protocols are associated with increased survival rates and favorable neurologic outcome. [2]

• Updated Brain Trauma Foundation Pediatric Severe TBI guidelines 2019 [3]
  • Level II and Level III recommendations for monitoring, thresholds, and treatment guidelines for Temperature, PaCO2, Nutrition, and Cerebral Perfusion Pressure indicators

Introduction

Goal of QI Study at CMH

Implement and standardize 2019 Pediatric TBI Guidelines at CMH

72 Hour Study Goals

- Targeted Temperature Management (TTM) (Temp <38.0 C)
- Avoid hyperventilation (PaCO₂ < 30mmHg) in patients without evidence of herniation
- Early enteral nutrition in patients without contraindications
- Maintain cerebral perfusion pressure (CPP >40mmHg) in patients with ICP monitors

<table>
<thead>
<tr>
<th>Clinical Indicators</th>
<th>Baseline</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTM</td>
<td>54%</td>
<td>80%</td>
</tr>
<tr>
<td>Avoid Hyperventilation</td>
<td>16%</td>
<td>90%</td>
</tr>
<tr>
<td>Early Enteral Nutrition</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>CPP</td>
<td>42%</td>
<td>80%</td>
</tr>
</tbody>
</table>
Methods

Update CMH Severe TBI Guidelines

Education initiative on updated guidelines: June 2019 - September 2019

Tracked clinical indicators:

• **Baseline** (June 2018 - May 2019) to **Postimplementation** (Oct. 2019 - current)

PDSA cycles utilized to implement frequent interventions.

Research Electronic Data Capture (REDCap) database utilized for data collection

Data exported to Microsoft Excel for run chart analysis
Methods

PDSA Cycle 1: Implementation of updated guidelines:
Timeframe: October 2019 – June 2020
• Educational materials (i.e., bedside binders)
• Bedside audits with just in time education

PDSA Cycle 2: Improve TTM:
Timeframe: July 2020 - Present
• Update admission orderset to notify provider when temp 37.0°C
• Provide detailed instructions and education on Blanketrol set up
• Schedule IV Tylenol for first 72hrs
**Goal:** Prevent hyperthermia (Temp < 38.0 C) in **80%** patients

Median: 54% patients with temperatures < 38.0 C
**PaCO2**

**Goal:** Avoid hyperventilation (PaCO₂ < 30mmHg) in 90% patients without evidence of herniation

**Percentage with PaCO2 > 30 for 72 hours**

**Total Severe TBI Patients Without Active Herniation**

Median: 16% patients with PaCO₂ > 30mmHg
Early Enteral Nutrition

**Goal:** Initiate enteral nutrition in **100%** patient without contraindications

- **Percentage of Patients Enteral Nutrition Initiated within 72 hours**
- **Cycle 1**
- **Cycle 2**

- **Total Severe TBI Patients** (excluding those with justified reasons for avoiding enteral nutrition)

**Median:** **100%** patients with early enteral nutrition initiation
Cerebral Perfusion Pressure

**Goal:** Maintain CPP > 40 mmHg in 80% patients with ICP monitors

Median: 42% patients with CPP > 40mmHg with ICP monitors
Conclusions

Data suggestive of improvement

- **TTM**: Improved adherence since beginning of cycle 2, though too early to reflect true trend
- **Early Enteral Nutrition**: Steady adherence to initiation of early enteral nutrition
- **Avoidance of Hyperventilation**: Shift in adherence suggests that educational interventions resulted in improved adherence to PaCO2 goals in patients without herniation.
- **Cerebral Perfusion Pressure**: Shift in data suggestive of improved adherence although still considerable variability around goal limited by small sample size of patients with ICP monitors.
Next Steps – PDSA Cycle 3

TTM

• Initiate esophageal probe utilization
• Focus on just-in-time education and follow up with nursing staff to understand barriers with temperature management
• Continue Blanketrol education with appropriate set up and management
• Ensure complete 72hr utilization of Blanketrol for TTM
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Questions