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

Michelle Brown

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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, PaCO<sub>2</sub>, Nutrition, and Cerebral Perfusion Pressure indicators

[1] Vavilala et al 2014 Crit Care Med

[2] O'Lynnger et al 2016 J Neursurg Pediatric

[3] Kochanek et al 2019 Ped Crit Care Med

# 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 (PaCO<sub>2</sub> < 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

Clinical Indicators	Baseline	Goal
TTM	54%	80%
Avoid Hyperventilation	16%	90%
Early Enteral Nutrition	100%	100%
CPP	42%	80%

# 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 (ie bedside binders)
- Bedside audits with just in time education

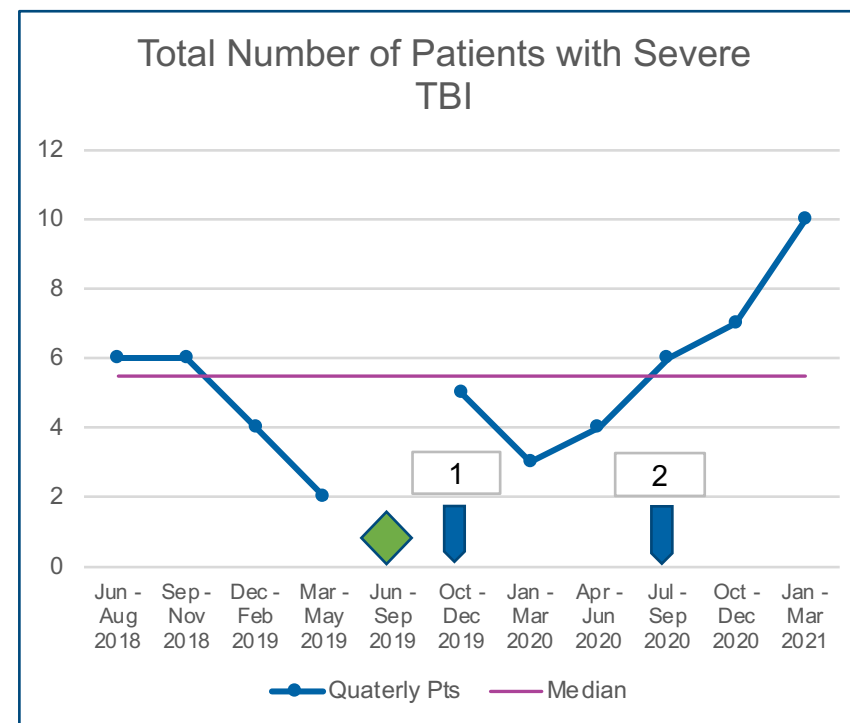
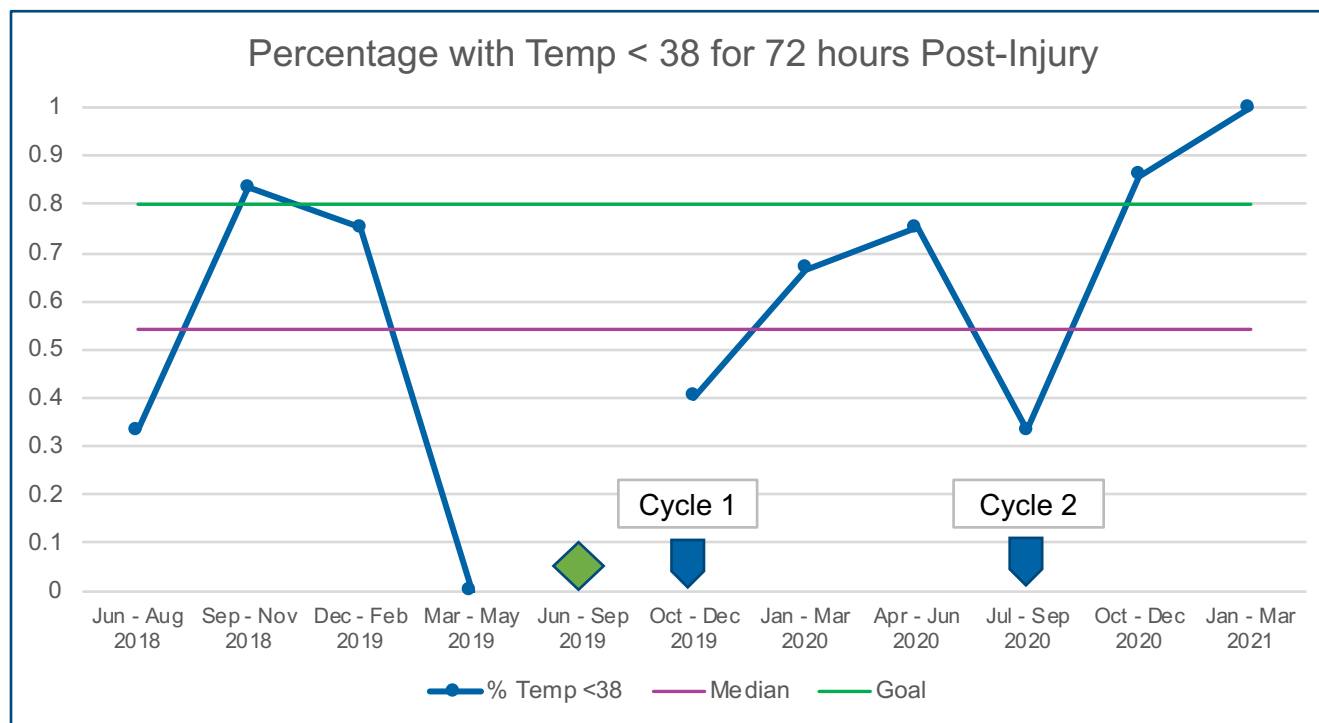
## PDSA Cycle 2: Improve TTM:

**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



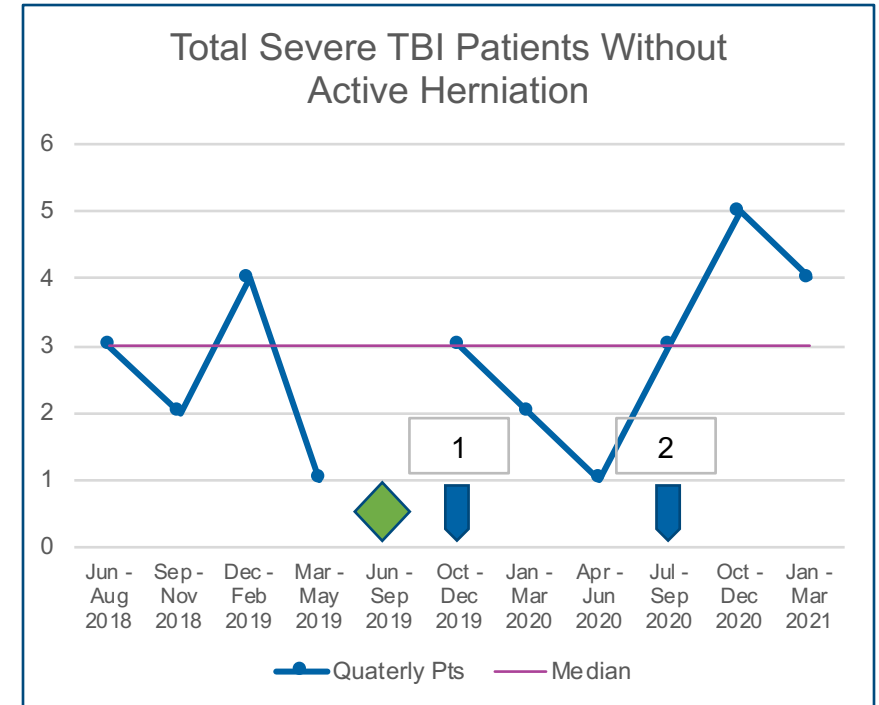
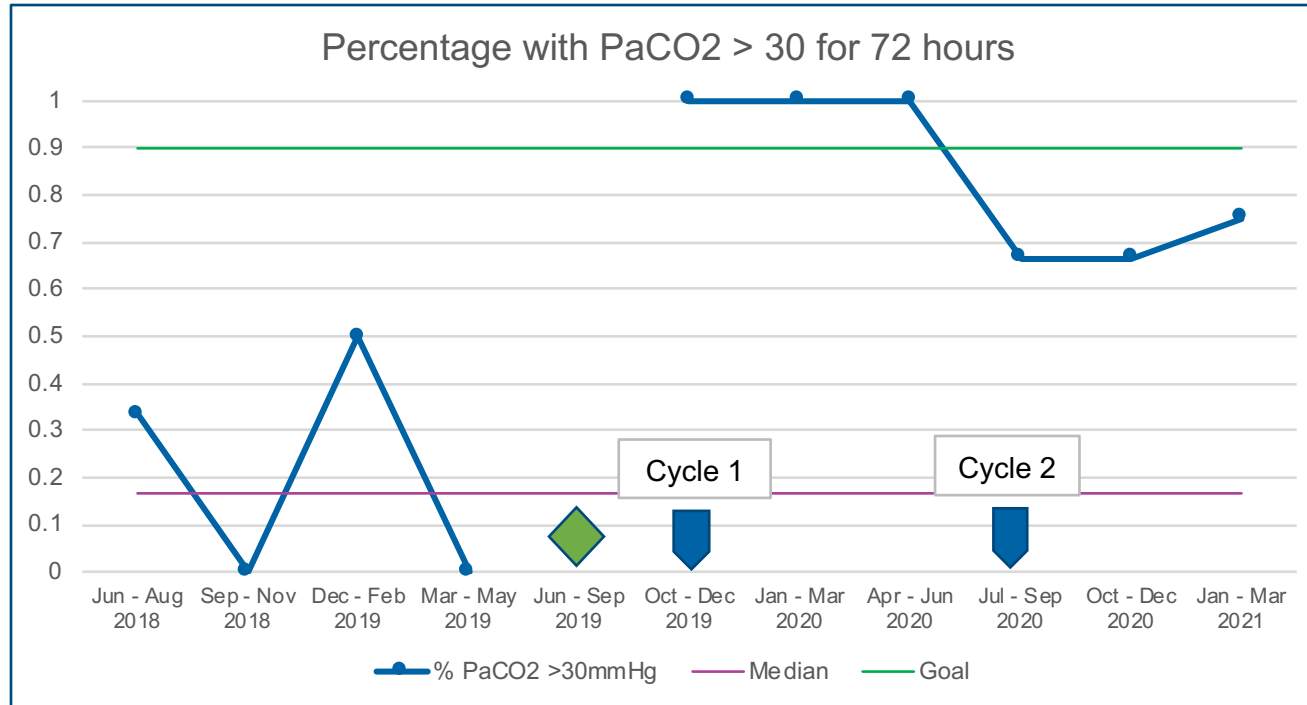
**Goal: Prevent hyperthermia (Temp < 38.0 C) in 80% patients**



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

# PaCO<sub>2</sub>

**Goal: Avoid hyperventilation (PaCO<sub>2</sub> < 30mmHg) in 90% patients without evidence of herniation**

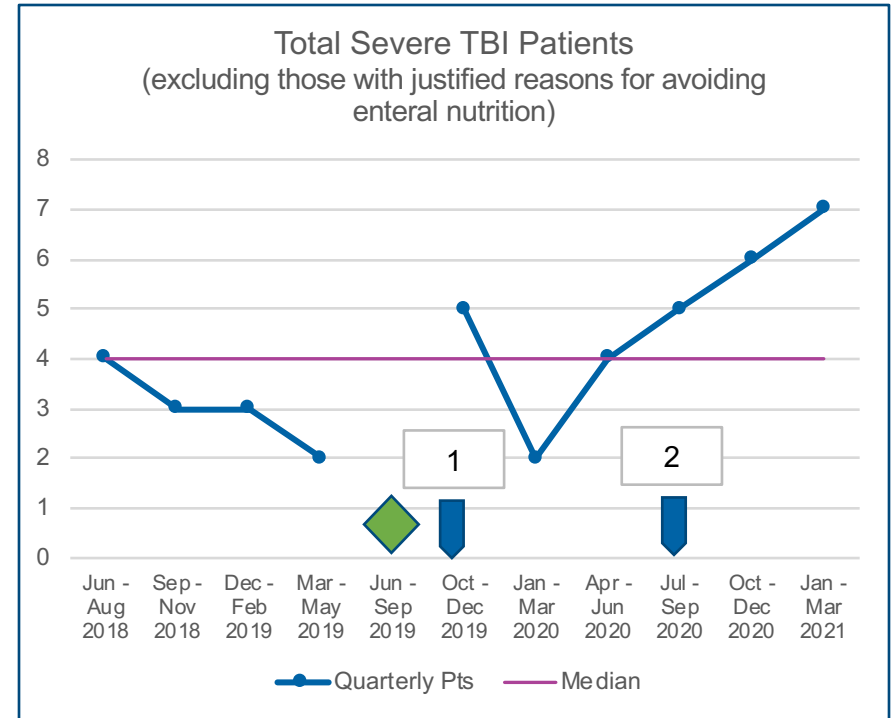
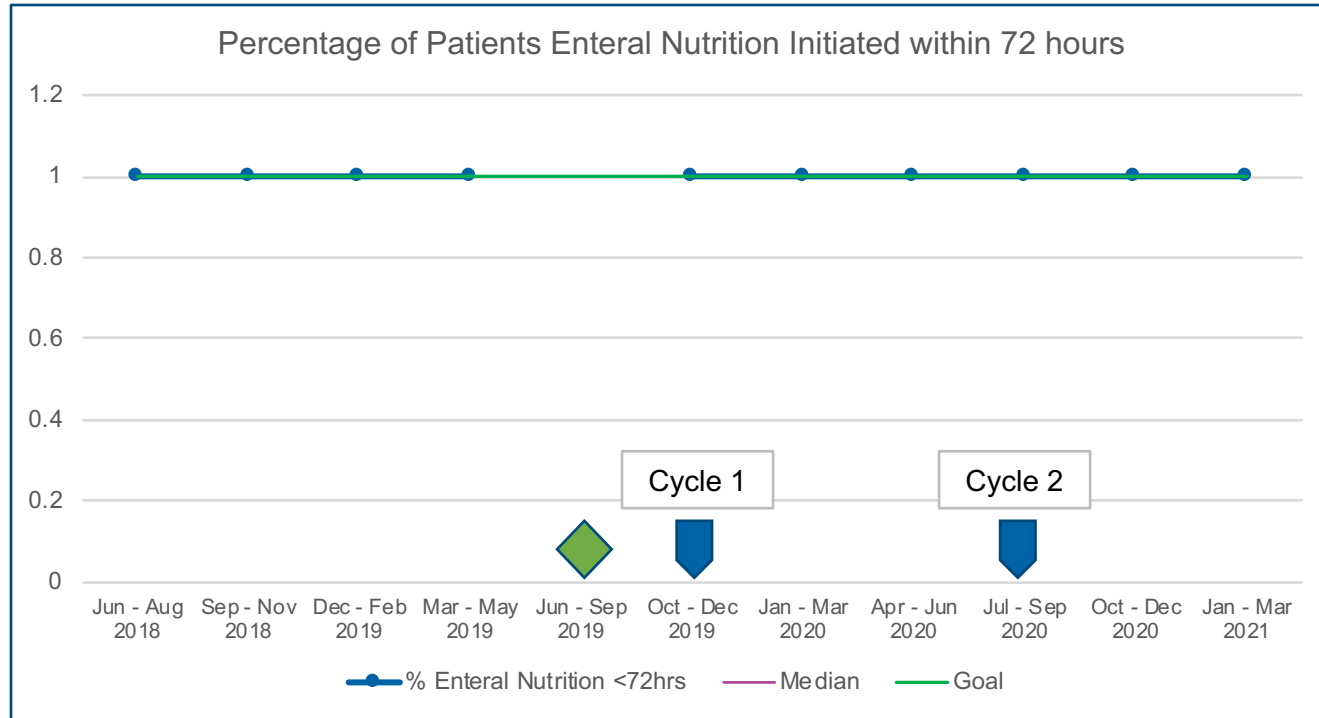


**Median: 16% patients with PaCO<sub>2</sub> > 30mmHg**



# Early Enteral Nutrition

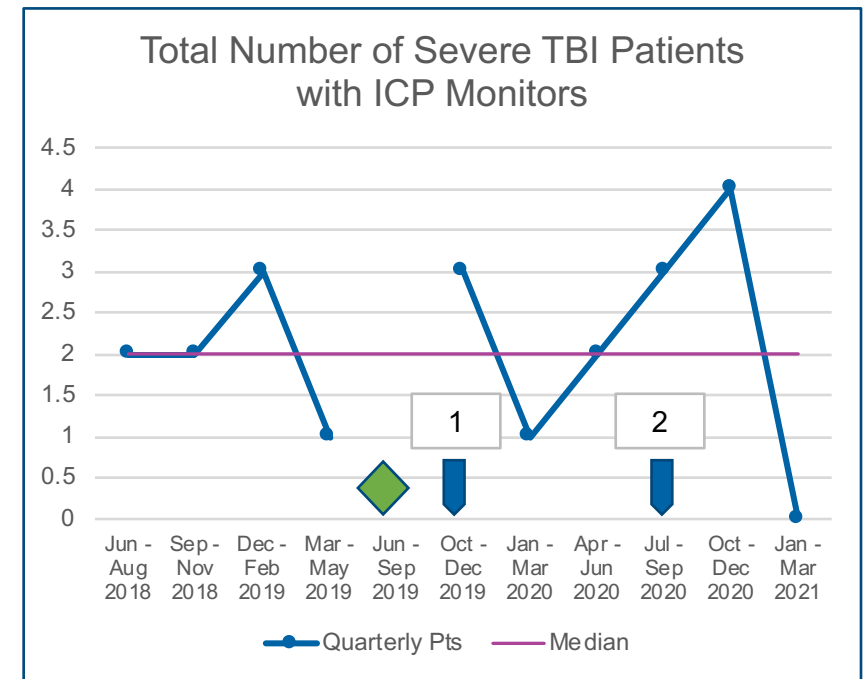
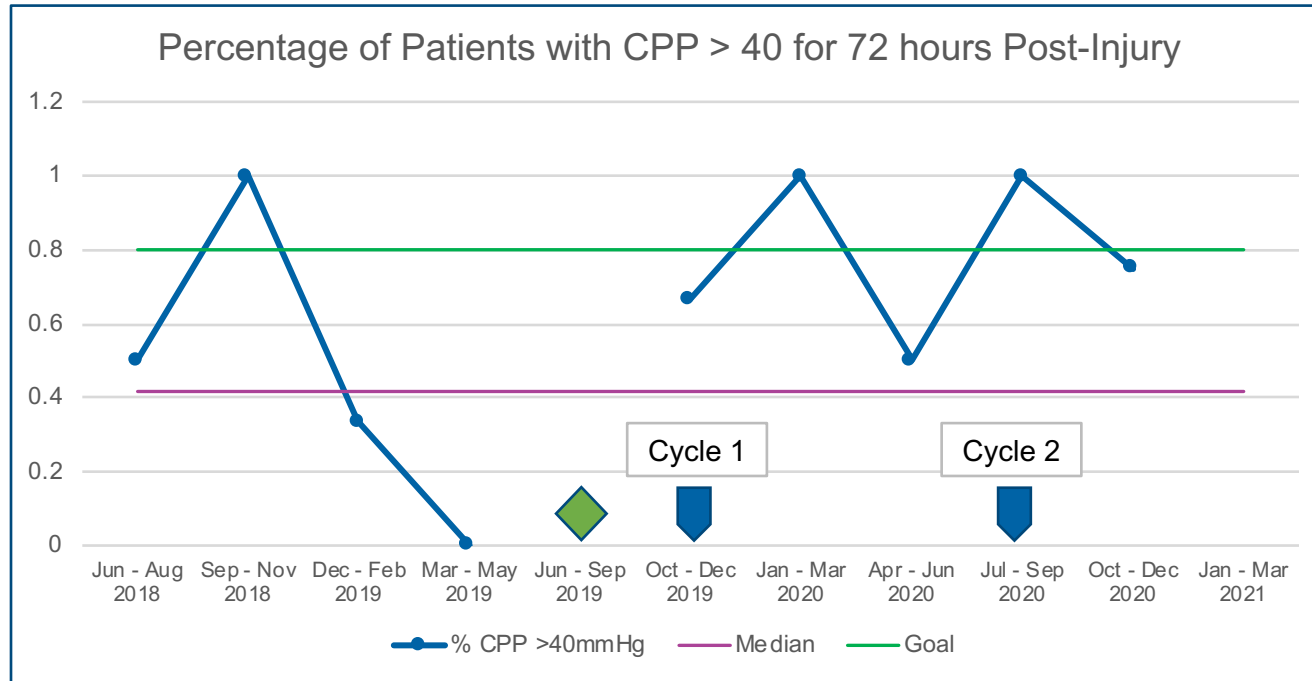
**Goal: Initiate enteral nutrition in 100% patient without contraindications**



**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 PaCO<sub>2</sub> 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

# Acknowledgements

- Jessica Wallisch, MD
- Sarah Brunner, MD

# Questions