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Hypothermia protocol

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Hypothermia Protocol

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Parkview Health

Background

- Cardiac arrest can lead to cerebral ischemia which, in turn frequently leads to severe neurologic impairment
- Mild Therapeutic Hypothermia To Improve The Neurologic Outcomes After Cardiac Arrest (N Eng J Med, Vol.346 No8)
 - Therapeutic mild hypothermia increased rate of favorable neurological outcomes and reduced mortality in patients who were successfully resuscitated after cardiac arrest
- Adverse effects associated with therapeutic hypothermia
 - Shivering - can lead to increased oxygen consumption and increase in heat production
 - Electrolyte abnormalities
 - Coagulopathy

Background

- Hypothermia Protocol
 - Achieve target cooling temperature within 3 hours of initiation
 - Target cooling temperature of 33°C for 24 hours
 - After 24 hours initiate rewarming at 0.25°C per hour
 - Maintain body temperature at 37°C for 24 hours after rewarming
- Methods of Cooling
 - External cooling device (Artic Sun)
 - Intravascular cooling (Zoll) plus normal saline
- Monitoring
 - Bedside Shivering Assessment Scale (BSAS) 0-3
 - 0-no shivering, 1- shivering localizes to neck/thorax, 2- Intermittent involvement of upper extremities, 3- Generalized shivering upper/lower
 - Richmond Agitation Sedation Scale (RASS)

Interventions for Shivering

Pre Protocol Change

- Vecuronium 0.1 mg/kg IVP, every 30 min PRN, for shivering not relieved by sedation

Post Protocol Change

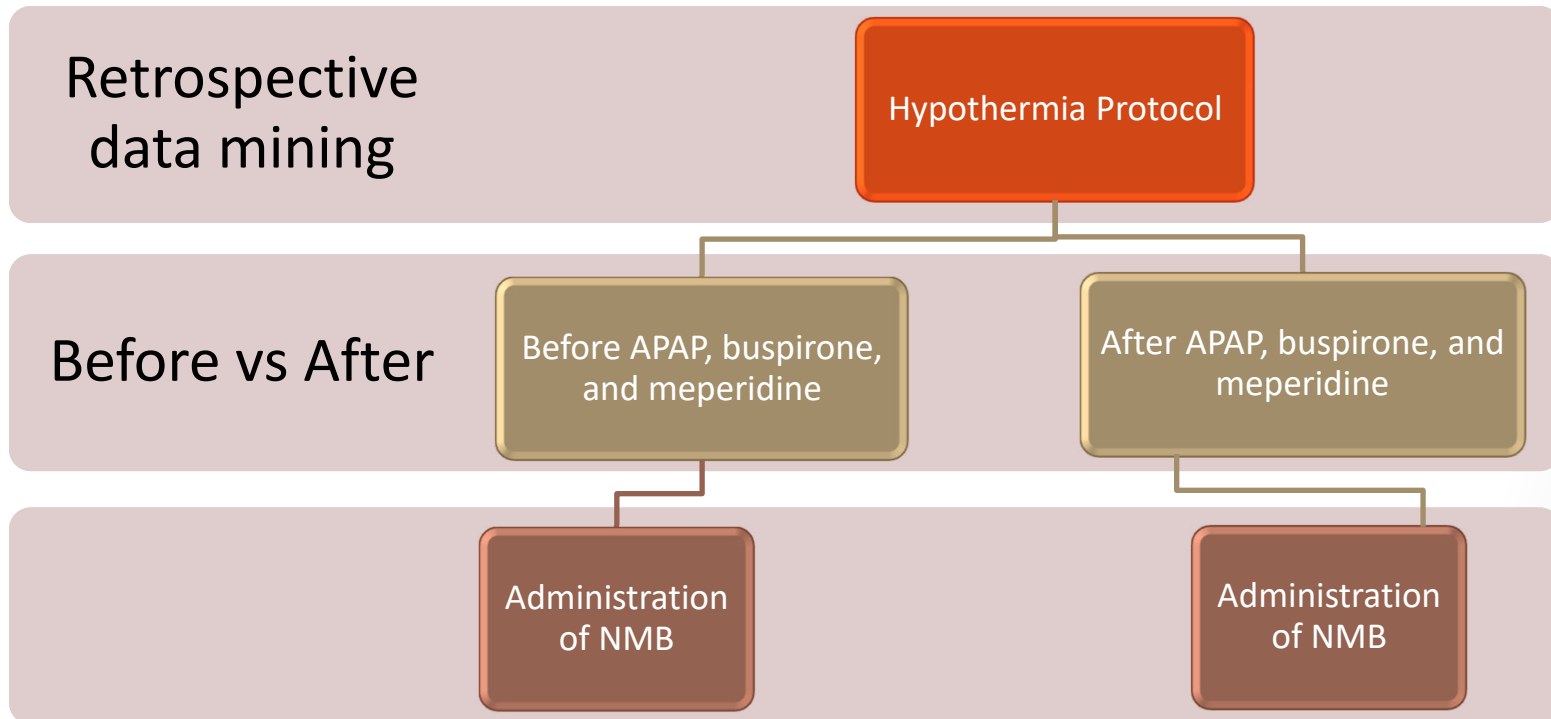
- Acetaminophen 650mg PO/NG/PR every 6 hours x 72 hours, contact physician if AST/ALT > 2xULN
- Buspirone 20mg PO/NG every 8 hours x 72 hrs, unless oliguric, anuric, or taking MAO inhibitors
- Meperidine 25mg IVP every 6 hours PRN BSAS >1 for 3 doses, contact MD if BSAS >1 after 3 doses
- Change to cisatracurium 0.2 mg/kg IVP every 30 mins PRN, for shivering not relieved by sedation. (Do not use if BIS >40 or RASS > -4)

Purpose

- Objectives:
 - Compare the need for administration of a neuromuscular blockers (NMB) in patients initiated on the hypothermia protocol before and after the addition of scheduled acetaminophen, buspirone, and PRN meperidine
- Null Hypothesis:
 - There is no difference in administration of NMBs between patients before the addition of acetaminophen, buspirone, and PRN meperidine compared to after the addition of these agent

Methods

- Retrospective chart review



Inclusion/Exclusion Criteria

Inclusion

- Initiated on hypothermia protocol
- After protocol change patients who received acetaminophen, buspirone, and meperidine PRN

Exclusion

Endpoints

- Primary endpoint
 - Evaluate the administration of NMB in patients before and after the addition of acetaminophen, buspirone, and meperidine to hypothermia protocol
- Secondary endpoints
 - Determine if there is a difference in the administration of NMB during cooling, maintenance, or rewarming phase
 - Determine if there was a difference between neurological outcome
 - Evaluate effects of premedication on time to target temperature
- Safety endpoints
 - In-hospital mortality

Baseline Characteristics

- Age
- Race
- Gender
- CrCl
- Height
- Weight
- BMI
- In or out of hospital arrest
- Witnessed arrest
- Initial cardiac rhythm
- Concomitant disease states (COPD, Asthma, CHF, DM, HTN, dyslipidemia, Hx of arrhythmias)
- Glucose
- Sedative used for ventilation
- RASS
- BSAS
- Presenting BP (MAP)
- Presenting GCS score
- Presenting temperature
- Presenting respiratory rate
- FiO₂/PaO₂
- Initial Arterial pH
- Initial Na⁺, K⁺, Scr, HCT, platelets, AST/ALT bilirubin, and WBC

Data Points

- Number of doses of acetaminophen
- Number of doses of buspirone
- Number of doses of meperidine
- Number of doses of NMB
- All cause mortality
- Time to temp goal
- Improved neurological function
- Target of 36°C
- Target of 33°C
- Renal impairment
- Alternative NMB used during therapy.
- GCS score
- Times shivering is noted in cooling phase
- Times shivering is notes in maintenance phase
- Times shivering is notes in re-warming phase
- Amount of opioids being used for pain
- Paralytic agents used
- AST/ALT
- Scr

Statistics

- Continuous variables (quantitative)
 - Student t-test
 - Wilcoxon rank sum
- Non-continuous variables (categorical)
 - Fisher's exact
 - Chi Squared test