Hypothermia protocol

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Hypothermia Protocol

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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 agents
Methods

- Retrospective chart review

Retrospective data mining

Hypothermia Protocol

Before vs After

Before APAP, buspirone, and meperidine

Administration of NMB

After APAP, buspirone, and meperidine

Administration of NMB
# Inclusion/Exclusion Criteria

<table>
<thead>
<tr>
<th>Inclusion</th>
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<tr>
<td>• Initiated on hypothermia protocol</td>
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<td>• After protocol change patients who received acetaminophen,</td>
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<td>buspirone, and meperidine PRN</td>
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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