Impact of Non-Opioid Analgesic Use In Surgical Critically Ill Adults Receiving Opioids
Kyle Herod, Aaron Bezio, Spencer Sutton, John Devlin PharmD

Opportunity
INTRODUCTION
- Opioids remain the gold standard, and often sole treatment for pain in critically ill adults after major surgery.
- However, their use is associated with a number of dose-related safety concerns including respiratory depression, constipation, hyperalgesia, delirium, and physical dependence.
- A multimodal analgesia strategy combining the use of multiple non-opioid analgesics has been shown to reduce opioid use and improve pain control after surgery in non-critically adults.
- The 2018 PADIS guidelines recommend the use of a multimodal analgesic approach [i.e., acetaminophen, ketamine, and neuropathic agents for pain control in the ICU].
- The impact of the PADIS guidelines on multimodal analgesic use, opioid exposure, level of pain, and opioid-related safety in critically ill adults after major surgery remains unclear.

OBJECTIVES
Among critically ill adults undergoing major surgery at one academic medical to compare the following outcomes before (2017) and after (2019) PADIS guideline publication:

Primary: Use of individual non-opioid analgesics
Secondary: Opioid exposure, prevalence of moderate and severe pain, prevalence of delirium, and time to first spontaneous bowel movement.

Approach
- Study IRB approved
- Consecutive patients during the years 2017 and 2019 who were admitted to a 1 of three SICUs at Brigham and Women’s Hospital who were admitted to the ICU after major surgery on a continuous IV opioid infusion and subsequently mechanically ventilated >/= 24 hours.
- The following patients were excluded:
  - Taking scheduled opioid >/= 100mg morphine equivalents prior to ED/hospital admission
  - Any use of methadone or buprenorphine prior to ED/hospital admission
  - History of opioid abuse/opioid use disorder at the time of ED/hospital admission
  - Taking >/= 3 non-opioid analgesics on a scheduled basis at the time of ED/hospital admission
  - Death within 48 hours of ICU admission (after major surgery)
  - Use of ECMO in the first 96 hours after ICU admission (after major surgery)
- Use of a continuous paralytic in the first 96 hours after ICU admission (after major surgery)
- Use of a continuous paralytic in the first 96 hours after ICU admission (after major surgery)

All clinical data was extracted by a trained data extractor from the Brigham and Women’s Hospital Epic clinical information system.
- The following data was extracted:
  - Baseline: Date of SICU admission, Unit, DOB, Age, Race, height, weight, BMI, Primary surgical procedure, Pa02, FiO2, SOFA scores, Vasopressor use, Glasgow Coma Score, # of home opioids/non-opioids
  - ICU day: volume of continuous infusions, schedule/prn opioids and non-opioid analgesics, haloperidol, pain scores (CPOT, VAS), CAM-ICU test, ventilation status, spontaneous bowel movement
- All clinical data was extracted by a trained data extractor from the Brigham and Women’s Hospital Epic clinical information system.
- The following data was extracted:
  - Baseline: Date of SICU admission, Unit, DOB, Age, Race, height, weight, BMI, Primary surgical procedure, Pa02, FiO2, SOFA scores, Vasopressor use, Glasgow Coma Score, # of home opioids/non-opioids
  - ICU day: volume of continuous infusions, schedule/prn opioids and non-opioid analgesics, haloperidol, pain scores (CPOT, VAS), CAM-ICU test, ventilation status, spontaneous bowel movement
  - Post ICU analgesic use
  - All data entered into RedCap.
  - Statistical analysis conducted via SPSS. P value < 0.05 significant

Impact
- This before-after study is the first to evaluate the use on non-opioid analgesics in critically ill adults after major surgery.
- Further research is currently being conducted to determine the relationship between non-opioid use, opioid use, and the following outcomes: pain, delirium, and bowel movements

Results

Table 1. Baseline Characteristics

<table>
<thead>
<tr>
<th>Type of Surgery, n [%]</th>
<th>2017 Cohort</th>
<th>2019 Cohort</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vascular/ Cardiovasc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICU admission</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Table 2. Continuous Opioid Infusion and Return of Bowel Function

<table>
<thead>
<tr>
<th>Type of Opioid</th>
<th>2017 Cohort</th>
<th>2019 Cohort</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fentanyl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrocodone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ketamine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Table 3. Degree of Moderate and Severe Pain

<table>
<thead>
<tr>
<th>Type of Pain</th>
<th>2017 Cohort</th>
<th>2019 Cohort</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Table 4. Degree of Moderate and Severe Pain

<table>
<thead>
<tr>
<th>Type of Pain</th>
<th>2017 Cohort</th>
<th>2019 Cohort</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


References