Challenges and Strategies for Managing Pain in Surgical ICU Discussion

Jagan Ramamoorthy, MD
Medical Director of Cardiothoracic Intensive Care Unit
University of Wisconsin Madison
WSA Meeting
9/7/2019

Disclosures

• None
Learning Objectives

• Understand the scope of the problem facing intensive care patients
• Evaluation of pain in the adult intensive care unit
• Identify medications commonly used and must know contraindications
• Non pharmacologic interventions
• Regional interventions
• Obtaining buy in from various services
• Give my opinion

Is this really important? (or pain is part of the human experience & surgery)

• Difficult weaning from the ventilator
  • Mechanical ventilation leads to numerous complication including pressure ulcers, muscle atrophy
• Pulmonary dysfunction
  • Inadequate pain control in the postoperative patient results in decreased lung volumes, decreased functional residual capacity, and decreased functional vital capacity
  • Cough reflex is compromised
    • Likely increasing risk of retained pulmonary secretions and pneumonia
    • Increased risk of pulmonary embolism due to vasoconstriction
• Cardiac Dysfunction
  • Stress cardiomyopathy (takuotsubo) has been associated with physical pain & catecholamine release
  • Pain increases myocardial oxygen consumption
    • Myocardial injury after noncardiac (MINS) surgery is a leading cause of death
      • Even ‘asymptomatic’ elevation of troponin can portend high mortality
Is this really important? (the ICU is a dreadful place to exist)

- Arterial line insertion
- Peripheral IV insertion
- Central Line insertion
- Peripheral blood draw
- Femoral sheath removal
- Respiratory exercises
- Mouth Care
- Eye Care
- Turning/mobilization
- Nasogastric tube insertion
- Nursing care
- Extubation

Is this really important? (my patient’s are being sedated)
Pain Assessment

- Management of pain for adult ICU patients should be guided by routine pain assessment and pain should be treated before a sedative agent is considered.
- If they can respond reliably - NRS
  Among critically ill adults who are able to self-report pain the 0-10 NRS administered either verbally or visually is a valid & feasible pain scale.
- Critically ill adults who are unable to self-report pain
  Behavior Pain Scale in intubated patients (BPS)
  Non intubated patients (BPS-NI)
  Critical-Care Pain Observation Tool (CPOT)

Pain Assessment – BPS & BPS-NI

1. Facial expression:
   1. Unsmiling
   2. Smiling
   3. Lightening
   4. Frowning

2. Movements of upper limbs:
   1. No movement
   2. Hand movement
   3. Lower limb movement
   4. Upper limb movement

3. Compliance with ventilation:
   1. No cooperation
   2. Intermittent cooperation
   3. Full cooperation

4. Total BPS value
   from 3 (no) to 12 (maximum) pain behavior rated using the BPS
Pain Assessment – CPOT

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial expression</td>
<td>0</td>
<td>No muscle tension observed</td>
</tr>
<tr>
<td>Iris</td>
<td>1</td>
<td>Pupils of contracting, head lowering, stiffening, or tears contracting</td>
</tr>
<tr>
<td>Grimacing</td>
<td>2</td>
<td>All-person facial movements plus eyelids tightly closed (the patient may present with savagely open or biting the unattached tube)</td>
</tr>
<tr>
<td>Body movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absence of movements or normal position</td>
<td>0</td>
<td>Presence of patient's normal position</td>
</tr>
<tr>
<td>Protection</td>
<td>1</td>
<td>Slow, cautious movements, touching or aching the pain site, seeking attention through nonverbal</td>
</tr>
<tr>
<td>Restlessness/Agitation</td>
<td>2</td>
<td>Pulling tubes, attempting to sit up, moving suddenly, and following, assessments, seeking or staff, trying to catch out of bed</td>
</tr>
<tr>
<td>Compliance with the ventilator (unconformal patient)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tolerating ventilator or movement</td>
<td>0</td>
<td>Abilities not activated, easy ventilation</td>
</tr>
<tr>
<td>Coughing, breathing</td>
<td>1</td>
<td>Coughing, breathing may be activated, start insomniac</td>
</tr>
<tr>
<td>Fighting ventilator</td>
<td>2</td>
<td>Patient is, lacking ventilation, smaller frequently activated</td>
</tr>
<tr>
<td>Vocalization: Patient's state</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talking in normal tone or no sound</td>
<td>0</td>
<td>Talking in normal tone or no sound</td>
</tr>
<tr>
<td>Crying, moaning</td>
<td>1</td>
<td>Crying, moaning</td>
</tr>
<tr>
<td>Crying, sobbing</td>
<td>2</td>
<td>Crying, sobbing</td>
</tr>
<tr>
<td>Voice tone or pitch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxed</td>
<td>0</td>
<td>No resistance to passive movements</td>
</tr>
<tr>
<td>Tense, rigid</td>
<td>1</td>
<td>Resistance to passive movements</td>
</tr>
<tr>
<td>Very tense or rigid</td>
<td>2</td>
<td>Strong resistance to passive movements or incapacity to complete them</td>
</tr>
</tbody>
</table>

TOTAL: 8

Pain Assessment – “I watch their vitals”

- Physiologic measures are NOT valid indicators for pain in critically ill adults
- They should only be used as cues to initiate further assessment using appropriate and validated methods such as the patient’s self-report of pain
Choice of Medications

- Think about contraindications
  - Impaired renal function and/or hepatic clearance
  - Hemodynamic instability
  - Pharmacologic side effects
    - Ileus
    - Respiratory depression
    - Delirium
    - Physiologic dependence
    - Urinary retention
    - Serotonin syndrome associations
      - Fentanyl, tramadol

### Relevant summary of expert recommendations

- Opioids remain a mainstay for pain management in most ICU settings
- Acetaminophen should be used as an adjunct to opioid to decrease pain intensity and consumption
- Low dose ketamine (1-2 µg/kg/hr) should be used as an adjunct to opioid therapy when seeking to reduce opioid consumption in post surgical consumption
- Neuropathic pain should be treated with a neuropathic pain agent (e.g. gabapentin, carbamazepine, pregabalin)

### Table: Choice of medications

<table>
<thead>
<tr>
<th>Drug</th>
<th>Renal failure</th>
<th>Hepatic failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opioids</td>
<td>Avoid: ropivacaine, etidocaine</td>
<td>Avoid: methadone</td>
</tr>
<tr>
<td></td>
<td>Avoid: methadone, morphine</td>
<td>Avoid: oxymorphone</td>
</tr>
<tr>
<td></td>
<td>May need to adjust dose</td>
<td>May need to adjust dose</td>
</tr>
<tr>
<td>Local anesthetics</td>
<td>No adjustment needed</td>
<td>No adjustment needed</td>
</tr>
<tr>
<td>Ketamine</td>
<td>Avoid in severe renal impairment</td>
<td>Avoid in severe renal impairment</td>
</tr>
<tr>
<td>Tylenol</td>
<td>May need to adjust dose</td>
<td>May need to adjust dose</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>Gabapentin should be dose adjusted based on creatinine clearance</td>
<td>Avoid carbamazepine, valproate</td>
</tr>
</tbody>
</table>

* Active metabolite ropivacaine can lead to neurotoxicity.
* A false metabolite ropivacaine isomers (3β,5β) and ketamine 5 glucuronide (3β) may cause pancreatitis, hyperglycemia, atropine.
* Printing of ketamine can lead to MND and WtSA accumulation.
Choice of medications – relevant summary of expert recommendations

- No routine use of IV lidocaine as an adjunct to opioid therapy
- No routine use of COX-1 selective NSAIDs
- Use opioids for procedures
- **Use lowest effective dose**
  - Recommended opioids are fentanyl, hydromorphone and remifentanil
  - Recommend against nitrous oxide and local analgesia for chest tube removal
- **Recommend against inhaled volatile anesthetics for procedural pain management**

---

**Ketamine**

Meta analysis of 19 RCTs with 1349 adults and 104 children

“Our analyses suggest that adding ketamine to an opioid in a PCA device significantly decreases pain intensity and morphine.

The degree of opioid-sparing at 24 hours after surgery also seemed to be stronger than what has been reported with acetaminophen and alpha2 agonists, and comparable with nonsteroidal antiinflammatory drugs.”
Non Pharmacologic interventions

- Virtual reality
  - Recommended against by SCCM
- Massage therapy
  - Recommended
- Music therapy
  - Recommended
- Cold therapy
  - Recommended
- Relaxation techniques
  - Recommended
- Transcutaneous electrical nerve stimulation
  - Not described
- Aromatherapy, acupressure, music at night for sleep
  - Recommended against
- Preoperative pain education
  - Unclear if it improves VAS/opioid consumption
  - Likely improves patient experience

Personal approach/preference

- Fentanyl choice opioid
  - Acquisition cost, RN preference, safety profile
  - Avoidance of meperidine, codeine, opioid agonist-antagonists
- Continuous ketamine infusion (with surgical team buy in)
  - Remind nurse that this should decrease opioid consumption
- Engage nursing on regimented approach to evaluation of pain
  - Empower them to be the patient’s advocate
  - Educate/remind them the importance of pain scoring
Personal approach/preference

• Consider NSAIDs for those select patients without renal dysfunction, surgical bleeding, GI bleeding, platelet abnormalities, CHF, cirrhosis, RAD, CV/vascular surgery (so very rare)
• Consider addition of dexmedetomidine for patients that require sedation as well
  • In patients with opioid tolerance or alcohol withdrawal
• Consider regional anesthesia
  • Epidurals especially in patients with compromised respiratory physiology
• Engage patient in preoperative setting if possible

Other

• QI project:
  • Mascarenhas et al. published a paper in BMJ “Using the Model for Improvement to implement the Critical-Care Pain Observation Tool in an adult intensive care unit”
    • Could help provide an implementation model for a QI project at your hospital.
References


References


8. Assessing pain in critically ill sedated patients by using a behavioral pain scale. Payen, Jean-Francois; MD, PhD; Bru, Olivier; Bosson, Jean-Luc; MD, PhD; Lagrasta, Anna; Novel, Eric; Deschaux, Isabelle; Lavagne, Pierre; Jacquot, Claude Critical Care Medicine. 29(12):2258-2263, December 2001.


References
