CRITICAL CARE BC
Provincial Health Services Authority

ICU Liberation Bundle – Element C

Choice of Analgesic and Sedation

Introduction

The "C" element of the ICU Liberation Bundle consists of choice of analgesia and sedation. This element focuses attention on constructing safe and effective non-pharmacological and medication regimens for the management of pain and agitation in critically ill adults, consistent with the pain, agitation/sedation, delirium, immobility, and sleep disruption PADIS guidelines (Devlin, 2018).

Assessment

Pain should be assessed every four hours or more, especially with agitation or procedures, using a validated tool, such as the Behavioral Pain Scale (BPS) or Critical Care Pain Observation Tool (CPOT). Depth of sedation should be assessed every four hours or more, using a validated tool (Richmond Agitation Sedation Scale (RASS)) to prevent over or undersedation. Each patient should have a daily RASS goal documented, and sedatives should be titrated to meet that goal.

Recommendations

- Consider Dexmedetomidine and Propofol as preferred sedatives as they are rapidly titratable.
- Avoid benzodiazepine infusions whenever safely possible, due to delayed titration and association with delirium and prolonged mechanical ventilation.
  - Consider benzodiazepine infusions when patients require deep sedation and propofol and opioids are insufficient, when patients have severe hemodynamic instability due to illness or propofol intolerance, and when patients have Propofol-related Infusion Syndrome (PRIS).
- Target light sedation, considering unit safety, unit experience and patient specific requirements.
- Discuss RASS goal, analgesic and sedative choices, and effectiveness during daily interdisciplinary rounds, report pain, sedation and delirium scores and response to treatment and trends.
- Encourage non-pharmacologic therapies as adjuncts to sedation.
- Document RASS and pain scores every four hours or more to support safe handover, continuity of care, quality improvement evaluation, research to improve patient outcomes, and growth of a learning health system.

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Additional tools

- **ICU Liberation A-F Bundle Overview Videos** – Click on Element C on the left-hand side
  - ICU Liberation A-F Bundle Overview (sccm.org)
- **Appendix A** – Pharmacologic and non-pharmacologic treatment recommendations
- **CCBC Podcast** – Sedation: The Art, The Science, the Shenanigans. Critical Care Conversations

References

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Appendix A - Intervention

Agitation: PADIS guideline recommendations for the treatment of agitation:

- Recommend light sedation (vs. deep sedation) in critically ill, mechanically ventilated patients
- Suggest using propofol or dexmedetomidine over benzodiazepines (midazolam or lorazepam) for sedation in critically ill mechanically ventilated patients

Sedatives for Adult Patients on Mechanical Ventilation in CC:

Drug		Onset and duration	Precautions for use	Usual dose	Significant adverse effects
Propofol		**Onset**: 1 min **Duration:** Short term: - 0.5 - 1 hr Long term *(more than 7 days):* - variable, 25-50 hr has been observed (depends on depth and time on sedation	Hypotension, bradycardia, hepatic/renal failure, pancreatitis	5-50 µg/kg/min, 0.3-3 mg/kg/hr	Hypotension, respiratory depression, bradycardia, propofol infusion syndrome – monitor lipids throughout therapy
Dexmedetomidine		**Onset**: 5-10 min with LD, 1-2 hr without LD **Duration**: 1-2 hr	Hepatic failure, symptomatic bradycardia	LD: 0.5-1 µg/kg (optional) MD: 0.2-0.7 µg/kg/hr	Hypo- or hypertension, bradycardia
Lorazepam	Caution	**Onset:** 5-20 min **Duration:** 4-8 hr, prolonged with CI	Delirium, renal failure	Intermittent: 1-4 mg IV every 4-6 hr	Oversedation, propylene glycol toxicity
Midazolam		**Onset:** 3-5 min **Duration:** 2-6 hr, prolonged with CI	Hepatic failure, end-stage renal failure, dialysis, delirium	0.02-0.1 mg/kg/hr	Oversedation

Abbreviations: CI = continuous infusion, LD = loading dose, MD = maintenance dose.

General Approach to Pharmacologic Management of Acute Agitation:

Situation	Preferred intervention
Agitation and pain	Fentanyl until pain resolves
Acute agitation in a patient who requires deep sedation	Propofol and an additional opioid infusion as needed
Acute agitation in a non-intubated patient	Anti-psychotic or dexmedetomidine infusion

Pain: PADIS guideline recommendations and suggestions for the treatment of pain.

General Approach to Treating Acute Pain in Adult CC:

Situation	Preferred intervention
Acute pain	Fentanyl IV push until pain resolves
Acute pain that persists or recurs	Fentanyl infusion plus fentanyl IV push for breakthrough pain
Acute pain in chronic opioid use	Account for prior opioid use when dosing IV opioid (consider ketamine)
Planned transition out of CC and patient on IV opioid infusion	Start scheduled oral or enteral opioid (e.g., oxycodone) therapy plus intermittent IV opioid (e.g., IV push or patient-controlled analgesia)

Opioids Commonly Used in the Adult CC:

Drug	Usual starting dose	Drug-specific adverse effects	Drug accumulation factors
Fentanyl	CI: 12.5-25 µg/hr OR CI: 0.35-0.5 µg/kg	Muscle rigidity	Hepatic failure, high volume of distribution, high lipophilicity, unpredictable clearance (long context-sensitive half-time) with prolonged infusion
Morphine	CI: 1-2 mg/hr	Hypotension, bradycardia from histamine release	Hepatic failure, active metabolite (3-morphine glucuronide) accumulation in renal failure
HYDROmorphone	CI: 0.25-0.5 mg/hr	Overdose effects from dosing errors of high-potency opioids	Hepatic failure

Drug	Usual starting dose	Drug-specific adverse effects	Drug accumulation factors
Methadone	N/A	QTc prolongation, serotonin syndrome	Long half-life, delayed clearance with hepatic and renal failure

Abbreviations: CI = continuous infusion, LD = loading dose.

Nonopioid Analgesia Commonly used in Adult CC:

Non-opioid analgesic	Recommendation
Acetaminophen	Use as an adjunct to opioid therapy to decrease pain intensity and opioid consumption.
Ketamine	Use low-dose ketamine (1-2 µg/kg/hr) as an adjunct to opioid therapy to reduce opioid use in post-surgical adults.
Gabapentin and pregabalin	Use neuropathic pain medications with opioids for neuropathic pain management. Use with opioids after cardiovascular surgery.
Lidocaine	Do NOT routinely use IV lidocaine as an adjunct to opioid therapy.
COX-1 selective NSAIDs	Do NOT routinely use a COX-1 selective NSAID as an adjunct to opioid therapy.

Non-pharmacological treatment/prevention	Recommendation
Massage therapy	Offer 10- to 30-minute massages once or twice daily for 1 to 7 days. Encourage family participation whenever possible.
Music therapy	Use patient preferred choice of music therapy for procedural and nonprocedural pain.
Cold therapy	Offer cold therapy for procedural pain.
Breathe therapy	Guide the patient through slow, deep breathing during procedural or nonprocedural pain/anxiety
Reposition	Reposition the patient every 2 hours, or more frequently, ensuring lumbar support when sitting and/or support between the legs while on their side to prevent/relieve pain.

Abbreviations: NSAID = nonsteroidal anti-inflammatory drug.