



Pain Control in the Perioperative Critically Ill Adult Patient

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Outline

- Assessment of Pain**
- Goals of Pain Control**
- Multimodal Approach and analgesic administration**
- Types of analgesics**
- 2018 Clinical Practice Guidelines from the Society of Critical Care Medicine**

Pain Management is COMPLEX!

- Patterns are highly individual.**
- From different sources**
- Patients have subjective perceptions**
- Patients have exceedingly variable tolerance.**

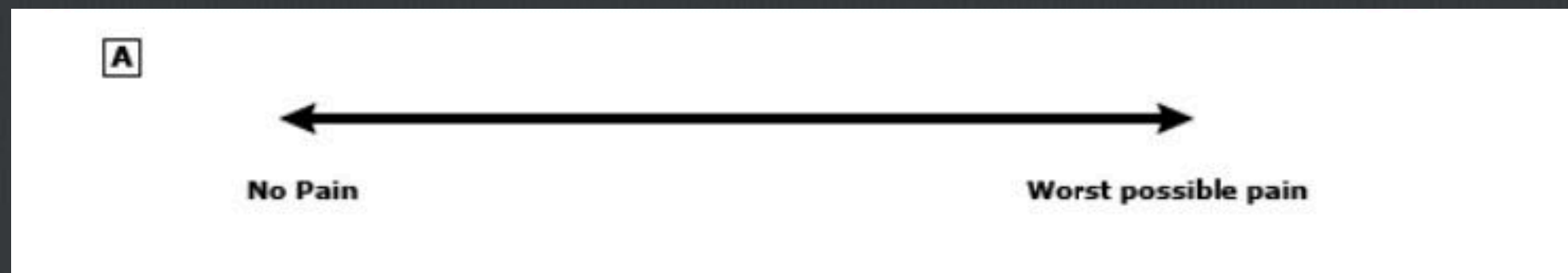
Pain

- “An unpleasant sensory and emotional experience associated with actual or potential tissue damage”**
- Considered to be “whatever” the experiencing person says it is, existing “whenever” the experiencing person says it does.**

Pain Assessment

- Routine, frequent and systematic**
- Documents pain severity, response to medication and development of any side effects**
- Improves outcomes**

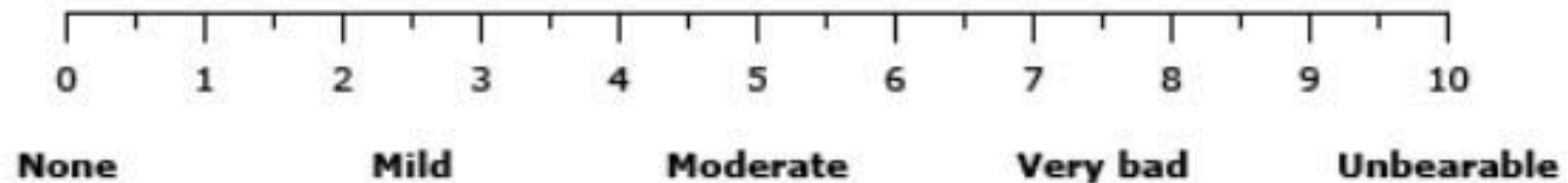
Visual Analog Scale (VAS)



Numerical Rating Scale (NRS)

B

What does your pain feel like?



Date: _____

Verbal Rating Scale (VRS) or Verbal Descriptor Scale

C

Choose the word that best describes your pain:

- None
- Mild
- Moderate
- Severe

FACES Pain Rating Scale

Wong-Baker FACES® Pain Rating Scale



0

No
Hurt



2

Hurts
Little Bit



4

Hurts
Little More



6

Hurts
Even More



8

Hurts
Whole Lot



10

Hurts
Worst

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Patients who CANNOT communicate

- Semiconscious or non communicative patients**
- Err on the side of presuming that pain is present and provide treatment even if signs of pain are conflicting or cannot be differentiated from other issues.**
- grimacing, writhing, or signs of sympathetic activation.**

Behavioral Pain Scale (BPS) 3-12

Item	Description	Score
Facial expression	Relaxed	1
	Partially tightened (eg, brow lowering)	2
	Fully tightened (eg, eyelid closing)	3
	Grimacing	4
Upper limbs	No movement	1
	Partially bent	2
	Fully bent with finger flexion	3
	Permanently retracted	4
Compliance with ventilation	Tolerating movement	1
	Coughing but tolerating ventilation for most of the time	2
	Fighting ventilator	3
	Unable to control ventilation	4

Critical Care Pain Observation Tool

Indicator	Description	Score	
Facial expression	No muscular tension observed	Relaxed, neutral	0
	Presence of frowning, brow lowering, orbit tightening, and levator contraction	Tense	1
	All of the above facial movements plus eyelid tightly closed	Grimacing	2
Body movements	Does not move at all (does not necessarily mean absence of pain)	Absence of movements	0
	Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements	Protection	1
	Pulling tube, attempting to sit up, moving limbs/ thrashing, not following commands, striking at staff, trying to climb out of bed	Restlessness	2
Muscle tension Evaluation by passive flexion and extension of upper extremities	No resistance to passive movements	Relaxed	0
	Resistance to passive movements	Tense, rigid	1
	Strong resistance to passive movements, inability to complete them	Very tense or rigid	2
Compliance with the ventilator (Intubated patients)	Alarms not activated, easy ventilation	Tolerating ventilator or movement	0
	Alarms stop spontaneously	Coughing but tolerating	1
	Asynchrony: blocking ventilation, alarms frequently activated	Fighting ventilator	2
OR			
Vocalization (extubated patients)	Talking in normal tone or no sound	Talking in normal tone or no sound	0
	Sighing, moaning	Sighing, moaning	1
	Crying out, sobbing	Crying out, sobbing	2

Goals of Pain Control

- Primary goal of analgesia :**
 - Provide OPTIMAL PATIENT COMFORT**

- Patient-specific and depends upon the clinical situation, individual tolerance of pain, and side effects of analgesic therapy.**

Secondary Goals of Analgesia

- Attenuation of adverse physiologic response to pain.**
- Prevention of development of chronic pain syndromes.**
- Control of anxiety and agitation**

Ideal Pain Drug

- Rapid onset**
- Rapid recovery**
- Lack of drug accumulation**
- No propensity to cause allodynia, hyperalgesia or dependence**
- No side effects or toxicity**

Multimodal analgesia

- Combination of analgesics and techniques, each with a different mechanism of action within the peripheral or central nervous systems.**
- Individualised based on the specific source and severity of pain in the patient.**

Advantages of Multimodal Analgesia

- Improved analgesia**
- Effective analgesia with lower opioids doses**
- Decreased risk of opioid-related side effects or eventual development of tolerance, withdrawal symptoms or opioid-induced hyperalgesia (OIH)**

Analgesic Administration

- Intravenous (IV) administration is generally preferred in critically ill patients.**
- GI absorption of medications is unpredictable in some critically ill patients.**
- SubQ or IM = erratic and potentially inadequate absorption.**
- Continuous or regular dosing schedule and Patient Controlled Analgesia**

OPIOID Analgesics

- First line Treatment**
- Efficacy is primarily due to binding to the mu-opioid receptor**
- At least 4 discrete opiate receptors have been identified in the CNS, accounting for multiple potential side effects.**

Opiate Receptor Activity

Opiate receptor	Pharmacologic effect
mu (μ)	Analgesia, miosis, respiratory depression, euphoria, physical dependence, suppression of opiate withdrawal
kappa (κ)	Spinal analgesia, does not suppress opiate withdrawal
sigma (σ)	Dysphoria, hallucinations, respiratory and vasomotor stimulation
delta (Δ)	Unclear

Type and Management of OPIOID Side Effects

1. Depressed Consciousness

- Enhance the CNS-depressant effects of other commonly used sedative-analgesic agents
- Maybe desirable in mechanically-ventilated patients allowing lower doses of other sedatives.
- May prolong MV and ICU stay
- Management: multimodal analgesia, opioid reduction, or opioid change.

Type and Management of OPIOID side effects

- 2. Depression of respiratory drive**
 - Important in spontaneously breathing patients or those for weaning from mechanical ventilator.**
 - Goal is to use the minimally effective dose to achieve pain control.**
 - Naloxone = reserved for progressive obtundation suggestive of imminent respiratory failure in non-ventilated patients.**
 - Administration of naloxone may cause sudden reversal of pain control, with tachycardia, hypertension, and pulmonary edema.**

Type and Management of OPIOID side effects

Hallucinations

- Patients should be reoriented and reassured.
- Doses of drugs associated with delirium are reduced or eliminated.

Hypotension

- Common in hypovolemic patients following rapid injection

Histamine Release

- Inversely correlated with analgesic potency and is greatest with large doses of meperidine, or morphine while fentanyl and remifentanyl release little histamine.

Type and Management of OPIOID side effects

Peripheral Vasodilation

- Due to central and peripheral vasodilatory effects.**
- May increase volume of fluid needed during resuscitation after major trauma or burn injury**

Nausea and Vomiting

- Direct stimulation of the chemoreceptor trigger zone**
- Treatment is similar in postoperative patients**

Type and Management of OPIOID side effects

- Ileus
 - Binding to local opiate receptors in the gut
 - Strategies to minimize = multimodal analgesia, opioid reduction and opioid rotation
- Urinary retention
- Pruritus
- Increased Intracranial Pressure

Tolerance, Withdrawal and Hyperalgesia

- Tolerance = administration of opioids has a diminishing effect over time.**
 - Higher doses are necessary to achieve adequate control of pain.**
 - Treatment options :**
 - supplementation with non-opioid analgesics**
 - use of other strategies for pain control**

Tolerance, Withdrawal and Hyperalgesia

- Withdrawal = when opioids are rapidly tapered or abruptly discontinued when high daily doses have been administered for a prolonged period.**
- Symptoms may occur due to rebound increases in neurotransmitter release**

Clinical Features of Opiate Withdrawal

Vital Signs

- Blood Pressure increased or unchanged; decreased if hypovolemic
- HR is Increased or unchanged
- Respiratory rate increased or unchanged

Gastrointestinal

- Nausea, vomiting
- diarrhea, increased bowel sounds

Neurological

- MS usually normal, irritable
- Restlessness
- Seizures (neonates only)
- Tremor
- yawning

Ophthalmologic

- Lacrimation
- Mydriasis

Skin

- piloerection
- Diaphoresis

Tolerance, Withdrawal and Hyperalgesia

- To prevent withdrawal symptoms, wean opioids slowly in critically ill patients who have received infusions for longer than 1 week.**
- When withdrawal is suspected, increase opioid dosing temporarily or a longer-acting opioid may be used.**
- Alpha 2 agonists may reduce the undesirable and psychologic effects of opioid withdrawal.**

Opioid-induced Hyperalgesia (OIH)

- State of nociceptive sensitisation caused by exposure to opioids.**
- Paradoxical response whereby a patient receiving opioids for the treatment of pain actually becomes more sensitive to certain painful stimuli.**
- Treatment options: reducing opioid use, opioid rotation, supplementation with nonopioid analgesics, and use of regional aesthetic techniques.**

Opioids to avoid in critically ill patients

- Meperidine /Demerol /Pethidine**
 - Metabolite (normeperidine) has neurotoxic effects.**
 - Normeperidine is renally excreted.**
- Opiate agonist-antagonists (butorphanol, nalbuphine)**
 - May precipitate withdrawal in chronic opioid users or in patients who have received an opioid infusion for a prolonged period.**

Considerations for selection of specific Opioid agent

- Fast acting and titratable
- Site of elimination
- Duration of action
- Histamine release

Non Opioid Analgesics

- When opioids are not well tolerated or necessary in critically ill patients**
- Primary therapy or as part of a multimodal approach.**
- May allow reduction or elimination of opioids and opioid-related adverse effects**

Considerations for selection of an IV nonopioid analgesic

- Antipyretic effect
 - Acetaminophen
- Severe burn or postoperative pain inadequately controlled with opioids
 - Ketamine
- Tolerance, withdrawal or hyperalgesia after opioid therapy.
 - Ketamine, dexmedetomidine

Considerations for selection of an IV nonopioid analgesic

Moderate pain and fever

NSAIDS

Neuropathic pain

Gabapentin, pregabalin

Prevention of development of

ketamine, pregabalin



Ibuprofen (Intrafen)

Only IV Ibuprofen available in the market

400 mg/4 ml and 800 mg/8 ml

COX 1:COX2 ratio is lower, less side effects.

Regional Anesthesia



- Neuraxial analgesia
- Epidural and spinal anaesthesia
- Peripheral Nerve blocks

Non pharmacologic Analgesics

- Acupuncture**
- Transcutaneous electrical nerve stimulation**
- Relaxation techniques**
- Massage therapy**
- Music therapy**

Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU

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Critical Care Medicine

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1. What factors influence pain in the critically ill adult during both rest and procedure?

Rest

- Psychologic
- Dermatographic

- Anxiety
- Depression

- Young age
- 1 or more comorbidities
- Previous surgery

During a procedure

- Preprocedural pain intensity
- Type of procedure
- Underlying surgery or trauma diagnosis
- Demographics

2. What are the most reliable and valid pain assessment methods to use in critically ill patients?

- Reference standard = **patient's self report of pain.**
- 0-10 Numeric Rating Scale** is a valid and feasible pain scale for those who are able to self report.
- For patients who cannot communicate:
 - Behavioral Pain Scale (BPS)**
 - Critical Care Pain Observation Tool (CPOT)**

2. What are the most reliable and valid pain assessment methods to use in critically ill patients?

- Proxy reporters : when appropriate, and when the patient is unable to self-report, family can be involved in their loved one's pain assessment process.**
- Physiologic measures (VS) are not valid indicators for pain in critically ill adults and should only be used as cues to initiate further assessment using appropriate and validated methods.**

3.1. Should **Acetaminophen be used as an adjunct to an opioid (vs an opioid alone) for pain in critically ill adults?**

- “We suggest using acetaminophen as an adjunct to an opioid to decrease pain intensity and opioid consumption for pain management in critically ill adults.” (conditional recommendation, very low quality of evidence)**

3.2. Should **ketamine be used as an adjunct to an opioid (vs an opioid alone) for pain in critically ill adults?**

- “We suggest using low-dose ketamine (0.5mg/kg IVP x 1 followed by 1-2 mcg/kg/min infusion) as an adjunct to opioid therapy when seeking to reduce opioid consumption in post surgical adults admitted to the ICU.” (conditional recommendation, very low quality of evidence)**

3.3. Should a **neuropathic pain medication be used as an adjunct to an opioid (vs an opioid alone) for pain in critically ill adults?**

- “We recommend using a neuropathic pain medication (e.g., gabapentin, carbamazepine, and pregabalin) with opioids for neuropathic pain management in critically ill adults.” (strong recommendation, moderate quality of evidence)**
- “We suggest using a neuropathic pain medication with opioids for pain management in Icu adults after cardiovascular surgery.” (conditional recommendation, low quality of evidence).**

3.4. Should a COX-1 selective NSAID be used as an adjunct to an opioid (vs an opioid alone) for pain in critically ill adults?

- “We suggest not routinely using a COX-1 selective NSAID as an adjunct to opioid therapy for pain management in critically ill adults.” (conditional recommendation, low quality of evidence).**

4. Should an **Opioid (vs no opioid) be used for critically ill adults undergoing a procedure?
Should a high-dose opioid (vs a low-dose opioid) be used for critically ill adults undergoing a procedure?**

- “We suggest using an opioid, at the lowest effective dose, for procedural pain management in critically ill adults.” (conditional recommendation, moderate level of evidence)**

5. Should **local analgesia (vs an opioid) be used for critically ill adults undergoing a procedure?**

- “We suggest NOT using local analgesia for pain management during Chest Tube Removal in critically ill adults.” (conditional recommendation, low quality of evidence)**

6. Should an NSAID administered IV, orally, and/or rectally (vs an opioid) be used for critically ill adults undergoing a procedure?

- “We suggest using an NSAID administered IV, orally, or rectally as an alternative to opioids for pain management during discrete and infrequent procedures in critically ill adults.” (conditional recommendations, low quality of evidence)**

7. Should **Cybertherapy (virtual reality),
(vs no use of cybertherapy) or **hypnosis**
(vs no hypnosis) be used for pain
management in critically ill adults?**

- “We suggest NOT offering cyber therapy or hypnosis for main management in critically ill adults.” (conditional recommendation, very low quality of evidence)**

8. Should **massage** (vs no massage) be used for pain management in critically ill adults?

- “We suggest offering massage for pain management in critically ill adults.” (conditional recommendation, low quality of evidence)

9. Should **Music Therapy (vs no music therapy) be used for pain management in critically ill adults to relieve both procedural and non-procedural pain?**

- “We suggest offering music therapy to relieve both nonprocedural and procedural pain in critically ill adults (conditional recommendations, low quality of evidence.)”**

10. Should **Cold therapy** (vs no cold therapy) be used for critically ill adults undergoing a procedure?

- “We suggest offering cold therapy for procedural pain management in critically ill adults (conditional recommendation, low quality of evidence)
- Remarks: Cold ice packs were applied for 10 minutes, and wrapped in dressing gauze, on the area around the chest tube before its removal.

11. Should **relaxation techniques (vs no relaxation techniques) be used for critically ill adults undergoing a procedure?**

- “We suggest offering relaxation techniques for procedural pain management in critically ill adults.” (conditional recommendation, very low quality of evidence)**

12. Should a **protocol-based (analgesia/analgo-sedation) pain assessment and management program be used in the care of critically ill adults when**

compared with usual care?

- Good Practice Statement:** 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.
- Recommendation:** “We suggest an **assessment driven protocol-based, stepwise approach for pain and sedation management** in critically ill adults.” (conditional recommendation, moderate quality of evidence)

Thank you

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