Maine Medical Center Burn-Soft Tissue Clinical Practice Guideline: Pain, Sedation, Anxiety, and Post-Burn Pruritus Management in Patients with Burn Injuries

Purpose: These guidelines are intended to facilitate the adequate treatment of pain in patients who experience burn injury. The goal is for the patient to be comfortable, awake, alert, and able to participate in routine daily care, physical therapy, occupational therapy, and psychotherapy sessions.

Background

Pain associated with burn injuries is considered the most painful trauma a person can sustain.

- Reasons for burn pain:
    - Regrowth of nerve endings in full thickness burns
    - Damaged nerve endings in superficial-partial thickness burns
    - Abnormal sensitivity to painful and normally non-painful stimuli in normal skin surrounding burn area
    - Donor sites, typically most severe for first 48 hours
    - Primary and secondary hyperalgesia, pain to light tactile stimuli, and prolonged, persistent pain due to altered responses to damaged skin
- Adverse effects to pain:
    - Physiologic effects: wound healing impediment and interference with wound care and therapies, indirectly increasing morbidity and mortality and prolonging hospital stays
    - Psychological effects: sleep disturbances, post-traumatic stress disorder, chronic pain syndrome, and suicidal ideation

Pain is difficult to manage in the burn population as it is multifaceted and constantly changing as patients undergo procedures and manipulation of painful wound sites.

- 3 types of burn pain:
    - Background pain: underlying pain from the initial injury that is ongoing and present even in the absence of activity or procedures
    - Breakthrough pain: more intense, unpredictable episodic pain that is associated with activities of daily living
    - Procedural pain: high intensity and short duration, associated with invasive procedures and ongoing daily burn care, such as wound cleansing, dressing changes, and therapy (PT/OT) sessions.
- As tissue regenerates, neuropathic pain or itching sensations can cause discomfort.
- Nearly half of all patients admitted with burn injuries have a prior history of substance abuse. Management of acute pain in patients with history of opioid use disorder is complicated by tolerance and hyperalgesia. Higher opioid doses may be required, and non-opioid medications (e.g. ketamine) and non-pharmacologic adjuncts are especially important for a multimodal approach to pain management in this population.

Patients with burn injuries can experience significant anxiety in anticipation of procedures.

- Anxiety can intensify over time and increase the perception of pain.
- It is important to take measures to ensure adequate pain control during burn procedures.

Pain assessment

Pain assessment should be conducted per "MMC Policy for Pain Assessment and Management-Adult/Pediatric," with the numeric rating scale (NRS) preferred in patients able to self-report pain and the critical care observation pain tool (CPOT) preferred in patients in the ICU who are mechanically ventilated or unable to self-report pain.

Pain management

In the majority of cases, pain is managed primarily by the burn service. It is imperative to re-evaluate pain requirements after each surgery.

Non-pharmacologic

Examples of nonpharmacologic strategies include:

- Distraction techniques, including self-distraction and the use of patient's family and friends
- Virtual reality
- Hypnotherapy
- Relaxation therapy
- Massage therapy
- Music
- Regional anesthesia – consult APMS
- Post-burn itching: emollients, compression

The burn unit psychologist is available to teach distraction methods and will be assisting with virtual reality technology.

Pharmacologic

- Strategies for pain management will be dynamic throughout the hospital stay, depending upon the severity of the burn injury, the patient's need for mechanical ventilation, patient location, and type of pain experienced.
- Opioids are the mainstay of pain management in patients with burn injuries.
- Multimodal approach with non-opioid analgesics and non-pharmacologic strategies should be employed to improve pain control and reduce the incidence of opioid-related side effects and hyperalgesia.
- It is important to manage procedural pain well to prevent anxiety over future sessions. Give oral opioids 30-45 minutes prior to dressing changes or wound care and give intravenous medications immediately before starting the procedure. During the procedure, frequently reassess pain and re-medicate as necessary.

Transition from ICU to Floor

Patient transfer from ICU or intermediate care to the general ward does not signify a reduction in the patient's pain. Continue to evaluate for background and procedural pain, taking into account surgeries the patient is having. Ideally, as the patient heals and breakthrough opioid requirements decrease, methadone should be weaned in preparation for patient discharge.

Discharge Pain Management

Multimodal pain control should continue after discharge. Consider that patients are often more active when discharged home, resulting in increased pain. Analgesia plan should consider dressing changes and exercises. Analgesic should be weaned in the following order: opioids first, then acetaminophen, NSAIDs, and gabapentin should be weaned last.

- Opioids
    - Discharge on an oral dose equivalent to which they are taking in hospital. The dose will be weaned in subsequent clinic visits over the next 1-3 weeks. Patients are typically discharged with 7 days of opioid analgesia as acute burn pain lasts until burn and donor sites are healed.
    - Typically, in alignment with PMP, prescriptions include:
        - Oxycodone 5-10 mg every 4 hours, #42-84 tabs
        - Hydromorphone 2-4 mg every 4 hours, #42-84 tabs
- Acetaminophen/NSAIDs
    - Alternate medications every 3 hours:
        - Acetaminophen 650-975 mg Q6hrs
        - Ibuprofen 400 mg Q6hrs
- Gabapentin: titrate up to effect until maximum dose, consider renal clearance
    - Will be weaned last.
    - Weaned by decreasing by 100 mg per dose each week until discontinued.
    - If symptoms return, stop weaning.
- Patients should continue non-pharmacologic measures learned during inpatient stay, for example distraction methods.

Please **see table 1** for options available for treatment of the several types of pain, anxiety, and discomfort, categorized by patient status and location. **Appendix 1** provides guidance on dosing considerations and precautions/contraindications to use.

Sedation

Sedation Assessment

- Patient sedation goals should be to maintain light sedation, in which the patient is arousable and able to purposefully follow simple commands, if clinically appropriate.
- The sedation scale utilized at Maine Medical Center is the Sedation Agitation Scale. Light sedation correlates with a score of 3 or 4.
- Non-benzodiazepine sedation is preferred due to its association with improved clinical outcomes (e.g. decreased time on the ventilator, decrease ICU length of stay) in mechanically ventilated ICU patients.

Table 1. Pharmacologic Treatment Options for Pain, Anxiety, and Post-Burn Pruritus

	Adult ICU – Mechanically Ventilated	**Adult ICU- Non-intubated**	**Adult Floor/IMC**
Background Pain			
Nonopioid	Acetaminophen PO/FT/ IV Ibuprofen PO/FT or Ketorolac IV Gabapentin PO/FT Ketamine continuous infusion Dexmedetomidine continuous infusion or clonidine PO/FT/SL	Acetaminophen PO/FT/ IV Ibuprofen PO/FT or Ketorolac IV Gabapentin PO/FT Ketamine continuous infusion Dexmedetomidine continuous infusion or clonidine PO/FT/SL	Acetaminophen PO/FT/ IV Ibuprofen PO/FT or Ketorolac IV Gabapentin PO/FT
Opioid	Hydromorphone continuous infusion 0.5-2 mg/h (consult provider if exceeding 2 mg/h) for 48 h then re-evaluate in discussion with provider Methadone PO/FT/IV (for TBSA $\geq$20%)	Methadone PO/FT/IV (for TBSA $\geq$20%) Oxycodone or hydromorphone PO/FT	Methadone PO/FT/IV (for TBSA $\geq$20%) Oxycodone or hydromorphone PO/FT
Breakthrough Pain	Fentanyl or hydromorphone IV bolus	Hydromorphone IV bolus	Hydromorphone or morphine IV bolus
Procedural Pain	Oxycodone or hydromorphone PO/FT Fentanyl IV bolus Ketamine IV bolus	Oxycodone or hydromorphone PO/FT Hydromorphone IV Fentanyl lozenge buccal Ketamine IV bolus Nitrous oxide (tank room)	Oxycodone or hydromorphone PO/FT Hydromorphone IV Fentanyl lozenge buccal Ketamine IV bolus Nitrous oxide (tank room)
ICU Sedation	Propofol infusion for first 48-72 h of admission,	N/A	N/A

	then transition to dexmedetomidine infusion if no contraindications		
Procedural Anxiety	Propofol infusion Midazolam IV bolus Dexmedetomidine infusion	Lorazepam PO/FT/IV Dexmedetomidine infusion	Lorazepam PO/FT
Post-Burn Itching	Hydroxyzine PO/FT/IV or cetirizine PO/FT Gabapentin PO/FT	Hydroxyzine PO/FT/IV or cetirizine PO/FT Gabapentin PO/FT	Hydroxyzine PO/FT/IV or cetirizine PO/FT Gabapentin PO/FT

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Appendix I. Medication Dosing and Considerations for Pain, Anxiety, and Post-burn Pruritus Management

Drug	Indication	Dosing	Considerations
Non-Opioid Analgesics			
Acetaminophen	Background pain	No risk factors for hepatotoxicity: 975 mg PO q6h or 1 g IV q6h (if NPO) Cirrhosis or chronic alcohol abuse: 975 mg PO q8h or 1 g IV q8h (if NPO)	Monitor liver function tests once weekly
Clonidine	Background pain Anxiolysis/Sedation	0.1-0.2 mg PO/SL q8h 0.2-0.4 mg PO/SL q6h	Avoid in patients with bradycardia or hypotension
Dexmedetomidine	Background pain and light sedation; Procedural sedation	0.1-1.4 mg/kg/hr continuous IV infusion	Avoid in patients with bradycardia or hypotension
Gabapentin	Background neuropathic pain	Age <65 years and with normal renal function (CrCl ≥60 ml/min): 300 mg PO q8h Age ≥65 years or moderately impaired renal function (CrCl 30-59 ml/min): 200 mg PO q12h Severe renal impairment (CrCl<30 ml/min): 200 mg PO q24h	Titrate every 3-5 days to effective dose, maximum 1200 mg 3 times daily for patients with normal renal function. Abrupt discontinuation should be avoided. Taper is recommended every 3-5 days. This is usually the last medication to be tapered upon patient discharge due to dual indication for itching and neuropathic pain.
Ketamine	Background pain Procedural pain	0.05-0.4 mg/kg/hr continuous IV infusion 0.2-0.5 mg/kg IV daily PRN	Consider in patients with a history of opioid tolerance, TBSA ≥20%, or patients who are not responding to routine pain management Monitor for psychomimetic (hallucinations, dissociation) effects. Benzodiazepines, such as lorazepam, are treatment of choice if this occurs. Monitor for sympathomimetic (hypertension, tachycardia) effects The safety of prolonged durations of continuous infusion (>4 days) has not been established Avoid use in patients with poorly controlled cardiovascular disease, active psychosis, pregnancy, severe hepatic dysfunction, or intraocular or intracranial pressure elevations due to structural abnormalities

Drug	Indication	Dosing	Considerations
NSAIDs (Ibuprofen, ketorolac)	Background pain	Able to take PO: ibuprofen 400 mg PO/FT q6h NPO: ketorolac 15 mg IV q6h x 5 days	Caution is advised when using NSAIDs in burn injury and patient selection is key. NSAIDs have been implicated in causing acute kidney injury in burn patients, and limited durations should be considered. **Exclusions:** New GI anastomosis, acute or chronic renal dysfunction, peptic ulcer disease and recent GI bleed (last 6-12 months), TBI/Spinal fractures/ spinal cord injuries (unless approved by neurosurgery). Long bone fractures (unless approved by orthopedics). Avoid concomitant use with therapeutic anticoagulation or corticosteroids due to increased risk of GI complications. Use caution in patients with significant cardiovascular risk factors (e.g. CAD, previous MI). If used in this population, recommend shortest duration possible. Avoid ibuprofen in patients with established cardiovascular disease on aspirin as ibuprofen interferes with antiplatelet activity.
Opioid Analgesics			
Fentanyl	Background pain (ICU-MV) Breakthrough pain Procedural pain	25-200 mcg/hr continuous IV infusion 25-100 mcg IV q30 min PRN 50-100 mcg IV q5 min PRN, or if able to take PO, 200 mcg lozenge buccal daily PRN	Concern for accumulation in severe hepatic impairment. Monitor for serotonin syndrome when used with other serotonergic agents (e.g. SSRI, linezolid, methadone). Re-dose fentanyl if patient is alert and still experiencing pain during procedure.
Hydromorphone	Background pain (ICU-MV) Background pain Breakthrough pain Procedural pain	0.5-10 mg/hr continuous IV infusion 2-4 mg PO q4h PRN moderate to severe pain or pretreatment for procedures or therapy sessions 0.5-2 mg IV q2h PRN 1-2 mg IV q30 min PRN	May be considered in patients tolerant to fentanyl

Drug	Indication	Dosing	Considerations
Methadone	Background pain	5 mg PO/FT/IV q8h and titrate every 3-5 days until pain control achieved	Consider in patients with TBSA ≥20% or history of opioid dependence/tolerance Methadone has a variable half-life of 7-65 hours, and steady state concentrations will not be achieved for 3-7 days. Do not stop abruptly. Wean methadone dose by 10-25% every 2-3 days. May discontinue once total daily dose is 10-15 mg. Our goal is to discontinue prior to discharge, if possible. If possible, obtain 12-lead EKG prior to initiation and with dosing titration.
Anxiolytics			
Lorazepam	Procedural anxiety (ICU) Procedural anxiety (floor/IMC)	1-2 mg IV q1h PRN 0.5 mg PO q4h PRN	
Midazolam	Procedural anxiety (ICU)	1-5 mg IV q1h PRN	
Propofol	Procedural sedation (ICU-MV)	5-60 mcg/kg/min continuous IV infusion PRN	Avoid in patients with hypotension
Post-Burn Pruritus			
Cetirizine	Itching	Normal renal function (CrCl >50 ml/min): 10 mg PO/FT q12-24h Impaired renal function (CrCl <50 ml/min): 5 mg PO/FT q24h	
Hydroxyzine	Itching	25 mg PO/IV q4h PRN	Monitor for anticholinergic side effects (sedation, dry mouth, urinary retention) and QTc prolongation. Use caution in elderly patients.
Gabapentin	Itching plus neuropathic pain	Age <65 years and with normal renal function (CrCl ≥60 ml/min): 300 mg PO q24h Age ≥65 years or moderately impaired renal function (CrCl 30-59 ml/min): 200 mg PO q24h Severe renal impairment (CrCl<30 ml/min): 100 mg PO q24h	If patient has concomitant neuropathic pain and itching, refer to pain dosing above. Titrate every 3-5 days to effective dose, maximum 300 mg 3 times daily for patients with normal renal function in post-burn itching trials. Abrupt discontinuation should be avoided. Taper is recommended every 3-5 days. This is usually the last medication to be tapered upon patient discharge due to dual indication for itching and neuropathic pain.

FT = feeding tube; ICU-MV = intensive care unit and mechanically ventilated; IV = intravenous; NSAIDs= non-steroidal anti-inflammatory drugs; PO = oral; PRN = as needed; SL = sublingual