

Pain Management Analgesia

Subjects: **Critical Care Medicine** | **Emergency Medicine**

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Effective pain management in hospitalized patients involves a multimodal approach tailored to the severity and type of pain (mild, moderate, or severe) and the patient's clinical condition. The goal is to provide adequate pain relief while minimizing side effects and preventing complications like opioid dependence or gastrointestinal and renal issues from NSAIDs.

- **Mild Pain:** Managed with non-opioid analgesics such as acetaminophen or NSAIDs. Topical agents like lidocaine patches or capsaicin cream may be used for localized pain.
- **Moderate Pain:** Combines non-opioid analgesics with low-potency opioids (e.g., tramadol). Adjuncts like topical therapies or neuropathic pain medications (e.g., gabapentin) may also be employed.
- **Severe Pain:** Requires short-acting opioids (e.g., morphine, hydromorphone) often administered via scheduled dosing or patient-controlled analgesia. Long-acting opioids are reserved for chronic conditions like cancer-related pain.

Special considerations include adjusting treatment for patients with chronic pain, hepatic or renal dysfunction, or risk factors for adverse drug reactions. Preventive measures, such as bowel regimens for opioid-induced constipation, and regular reassessment of pain control are critical components of care.

The approach prioritizes not just the relief of pain but also the functional improvement and safety of patients.

Consultation with pain management or palliative care teams is advised for complex or refractory cases.

critical care

analgesia

multimodal

emergency medicine

1. Pain Management Regimens: Mild, Moderate, Severe Pain with Breakthrough Pain Options

Mild Pain

- **Acetaminophen (Tylenol):**
 - **PRN:** 650 mg q4hr or 1000 mg q6hr as needed.
 - **Scheduled:** Consider for patients with uncontrolled mild pain.
 - **Max Doses:**
 - 4g/day in patients with normal liver function.
 - 2g/day in those with liver dysfunction or cirrhosis.
 - **Routes:** Oral or rectal preferred; IV is available but expensive.
- **NSAIDs:**
 - Use cautiously in patients at risk for GI bleeding or acute kidney injury.

- **Ibuprofen:** 400 mg PO every 6–8 hours.
- **Naproxen:** 250–500 mg PO every 12 hours.
- **Ketorolac (IV/IM):** 10–15 mg q6hr (limit use to 48 hours to reduce risks).
- Consider topical NSAIDs (e.g., **Diclofenac gel**) for localized musculoskeletal pain.

Moderate Pain

- **Combination Therapy:**
 - Acetaminophen ± NSAIDs for additive effects.
- **Topical Analgesics:**
 - **Lidocaine Patch:** Apply up to 3 patches; remove after 12 hours.
 - **Capsaicin Cream:** Effective for neuropathic and osteoarthritis pain.
- **Low-Potency Opioids:**
 - **Tramadol:** 50 mg PO q4–6hr PRN.
 - Avoid in patients with seizure history.
 - Consider consultation for opioid-sparing strategies if chronic pain.

Severe Pain

- **Opioid Therapy:**
 - **Short-acting Opioids:** First-line for acute severe pain.
 - **Oxycodone:** 5 mg PO q4–6hr PRN.
 - **Hydromorphone (Dilaudid):** 1–2 mg IV q4–6hr PRN.
 - **Morphine:** IV or PO options; adjust for renal impairment.
 - **Fentanyl (IV):** Short half-life, for acute episodes.
 - Use conversion charts for switching opioids; start at 75% of equianalgesic dose when rotating.
- **Adjuncts:**
 - **Ketamine:** Consult pain service. Useful for opioid-sparing.
 - **Methadone:** Requires specialist involvement for titration.
- **Neuropathic Pain:**
 - **Duloxetine or Venlafaxine.**
 - **Gabapentin:** Start at 100–300 mg PO nightly, titrate.

Breakthrough Pain

- **PRN Opioids:**
 - 10–15% of total daily opioid dose, every 2–4 hours as needed.

- Ensure opioid conversion and rescue dosing are appropriately calculated.

General Considerations

- **Prevent Constipation with Opioids:**
 - Prophylaxis: Senna and docusate or polyethylene glycol (Miralax).
- **Multimodal Pain Control:**
 - Combine pharmacologic and non-pharmacologic options (e.g., warm compresses, physical therapy).
- **Consult Services:**
 - Pain management or palliative care for complex cases or refractory pain.

2. Summary: Management of Vaso-Occlusive Crisis in Sickle Cell Disease

Nonnarcotic Analgesics for Mild Pain

- **Acetaminophen (Tylenol):** 500–1,000 mg q4–6 hours (Max < 4,000 mg/day).
- **Aspirin:** 650–1,000 mg q4–6 hours (Max < 4,000 mg/day).
- **NSAIDs:**
 - **Ibuprofen:** 200–400 mg q4–6 hours.
 - **Naproxen:** 500 mg initially, then 250 mg q6–8 hours.
 - **Ketoprofen:** 25–75 mg q6–8 hours (Max < 300 mg/day).

Narcotic Analgesics for Moderate Pain

- Weak opioids like **codeine** and **oxycodone** can be titrated for moderate pain control.
- Avoid prolonged use due to dose-limiting side effects (e.g., sedation, nausea, vomiting).

Opioids for Severe Pain

- Administer stronger opioids parenterally or via patient-controlled analgesia (PCA) for severe pain:
 - **Morphine:**
 - Oral: 15–30 mg q4 hours.
 - IV: 0.1–0.15 mg/kg q3–4 hours.
 - **Hydromorphone (Dilaudid):**
 - Oral: 2–4 mg q4–6 hours.
 - IV: 1–2 mg q4–6 hours.
 - Avoid **Meperidine** due to short half-life, risk of neurotoxicity, and complications with repetitive dosing.

Breakthrough Pain

- Administer 1/4 to 1/2 of the maintenance dose based on sedation level.
- If 3+ rescue doses are needed in 24 hours, increase maintenance dose by 25–50%.

Supportive Care

- **Fluids:**
 - Oral hydration for mild crises; IV fluids for severe dehydration or vomiting.
 - Use balanced solutions (e.g., 5% dextrose in 0.25% normal saline) after correcting deficits.
- **Oxygen:**
 - Only for hypoxemia; unnecessary in normoxic patients.
 - Use arterial blood gas if pulse oximetry is unreliable.

Hydroxyurea

- Indicated for patients with severe recurrent crises.
- Dosage: Start at 500 mg/day, titrate to 1,000–2,000 mg/day.
- Monitor blood counts every 4–6 weeks.

Nonpharmacologic Strategies

- Heat application, physical therapy, TENS, distraction techniques, and self-hypnosis.

Key Management Principles

- Avoid delays in analgesia.
- Prefer scheduled dosing over PRN.
- Regular reassessment of pain, sedation, and vital signs.
- Transition to oral analgesics as pain resolves and taper doses gradually.
- Provide a prescription for pain control upon discharge if needed.

3. Opioid Overdose Order Set

3.1. Monitoring and Initial Assessment

- **Vitals Monitoring:**
 - Continuous pulse oximetry, cardiac telemetry.
 - Capnography if available (preferred for assessing hypoventilation).
 - Measure respiratory rate and mental status every 15 minutes until stable, then every hour.
- **Labs:**
 - Arterial blood gas (ABG) or venous blood gas (VBG) to assess CO₂ retention.
 - Basic metabolic panel (BMP) to check for acidosis or hyperkalemia.
 - Serum glucose to rule out hypoglycemia as a contributor.
 - Urine toxicology screen.

- Blood ethanol level if history or suspicion of concurrent alcohol ingestion.
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3.2. Airway and Breathing

- **Airway Support:**
 - Ensure airway patency; initiate bag-mask ventilation if respiratory rate < 8/min or oxygen saturation < 92% despite oxygen.
 - **Supplemental Oxygen:**
 - Administer 2–6 L/min via nasal cannula or non-rebreather mask as needed to maintain oxygen saturation > 92%.
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3.3. Naloxone Administration

- **Initial Dosing:**
 - **Naloxone (Narcan):**
 - **IV Route:** 0.04 mg IV bolus initially; repeat every 2–3 minutes, titrate up to 2 mg as needed for adequate respiratory effort.
 - **IM/SC Route:** 0.4 mg; may repeat every 2–3 minutes.
 - **Intranasal Route:** 4 mg in one nostril, may repeat after 3–5 minutes if no response.
 - **Consider Infusion:**
 - For long-acting opioid overdoses or recurrent respiratory depression:
 - **Naloxone Infusion:** Start at 0.02–0.1 mg/hour; titrate to effect (based on respiratory rate and oxygenation).
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3.4. Supportive Measures

- **IV Fluids:**
 - Start **Normal Saline (0.9% NaCl)** 1 L bolus if hypotension is present.
 - **Hypoglycemia Management:**
 - If blood glucose < 70 mg/dL, administer:
 - **Dextrose 50% (D50):** 1 amp (25–50 mL) IV push, repeat as needed.
 - **Bicarbonate Therapy:**
 - If severe acidosis (pH < 7.2):
 - **Sodium bicarbonate:** 1 amp IV, repeat based on ABG results.
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3.5. Observation and Tapering

- Observe patients for at least 2–4 hours after last naloxone dose for signs of recurrent respiratory depression.
 - Extend observation to 6–12 hours for long-acting opioids (e.g., methadone, extended-release formulations).
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3.6. Education and Prevention

- Assess for opioid use disorder (OUD) and consider initiating treatment:
 - **Buprenorphine** for withdrawal management.
 - Referral to addiction medicine or pain management.
 - Prescribe a **naloxone kit** for discharge with education on overdose prevention and response.
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3.7. Documentation

- Record time, dose, and route of naloxone administration.
 - Document patient's response to treatment, including changes in respiratory rate, oxygenation, and mental status.
 - Note any complications (e.g., withdrawal symptoms, agitation).
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