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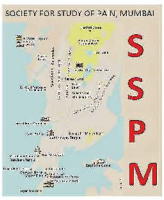

Under the aegis of Society for Study of Pain, Mumbai



Handbook of Pain Management

A Case-based Approach

Jitendra Jain

Foreword
Rajendra Sharma

JAYPE

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CHAPTER 4

Acute Pain Management

Dinesh Sahu, Kailash Kothari

Principle of pain management remains the same whether it is acute or chronic, nociceptive or neuropathic.

PRINCIPLES OF ACUTE PAIN MANAGEMENT

- Assessment of pain for possible diagnosis of pain
- Note down numerical rating scale (NRS) or visual analog scale (VAS)
- Mark the area of pain on pain diagram
- Follow **Table 4.1** for starting the pain medication if needed
- Adjuvant to be added if needed
- Polypharmacy (more than one pain killer and adjuvant) of pain killer might be needed in moderate to severely painful conditions
- Regular assessment of VAS or NRS to check effectiveness of pain control (2–4 hrly in inpatients, outpatient can keep a pain diary)
- Regular reassessment of improvement in pain by adjusting or starting a new treatment or withdraw medications
- Always combine rehabilitation of patient physical and mental both to decrease pain medicine requirement and recurrence of pain.

Acute pain must be treated promptly and adequately. If it is not controlled in time then it might result in physiological and psychological changes in the patient which in majority of patients could have bad outcome **(Table 4.2)**. Like in cases of polytrauma, along with maintaining hemodynamic stability of patient, one also needs to control pain to decrease stress on heart and body in general.

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Table 4.1 Acute pain treatment chart

Numerical score	*Grade of pain*	*Mode of analgesic delivery*	*Possible medication*
1–3	Mild	Reassurance or SOS mild oral pain medication	Preferably no medication, reassurance or paracetamol or NSAID
4–7	Moderate	Oral or transmucosal route or rectal	Paracetamol + NSAID or ± Weak Narcotic (Codeine or Tramadol or low dose Morphine) with or without adjunct medicine
8–10	Severe	Transmucosal or intramuscular IM or intravenous IV or interventional procedure	Paracetamol ± NSAID (Diclofenac or Ketorolac) ± Strong Narcotic (Fentanyl or Morphine), minimum two medicine combination with adjuvant medicine

Table 4.2 Systemic effects of acute pain

Respiratory system	Decreased lung volumes, atelectasis, hypercarbia and hypoxemia
Cardiovascular system	Tachycardia, hypertension, cardiac arrhythmias
Endocrine system	Increased metabolism, hyperglycemia, sodium and water retention Protein catabolism
Urinary system	Renal failure, urinary retention, urinary incontinence
Coagulation system	Hypercoagulability, DVT
Gastrointestinal system	Constipation, hyperacidity, peptic ulcer, Ileus
Immune system	Decreased immunity
Neuropsychological system	Hypersentivity to pain, sleeplessness, anxiety, anger, depression Functional decline, disability, social isolation, suicidal tendency

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Early control of pain might help in better patient outcome from surgery, trauma or any disease. Adequate attention to pain relief can help in promoting a feeling of well-being which has a positive influence on postoperative outcome.

Pain treatment should always be started as soon as patient starts complaining of pain. The target of pain relief should be between 70–100% in case of acute pain. The best way to start a pain medication

is to record NRS (numerical score) of the patient, i.e. pain score mentioned in the Pain Assessment, Chapter 3 (Page 20).

PAIN MEDICATIONS

- Nonopioid analgesics [Paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs)]
- Opioid analgesics (e.g. Codeine, Morphine, Fentanyl, Oxycodone)
- Local anesthetics (e.g. Lignocaine, Bupivacaine, Ropivacaine)
- Coanalgesics (e.g. antidepressants, anticonvulsants, ketamine)
- Adjuvant medications (e.g. corticosteroids, muscle relaxants, bisphosphonates).

Methods of Administration

Depending on the patient's pain condition mode of administration has to be decided. If pain is severe then IV or IM or intranasal route would be preferable. If patient cannot take medicine orally then transmucosal or IV or IM or transdermal route would be used to get pain relief to the patient. If patient is being given oral medication the medication should be preferably fast water soluble for faster onset of pain relief action and not a slow release preparation or transdermal for acute pain conditions. Various methods of administrations are given below:

- Systemic administered analgesia
  - Oral route
  - Intravenous route
  - Intramuscular and subcutaneous routes
  - Rectal route
  - Transdermal route
  - Transmucosal routes
- Regionally and local administered analgesia
  - Epidural analgesia
  - Intrathecal analgesia
  - Regional analgesia and peripheral nerve block
  - Other local analgesic techniques
- Patient-controlled analgesia (PCA)
  - Epidural PCA analgesia
  - Intravenous PCA analgesia

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Nonpharmacological Treatments

- Psychological interventions
- Physiotherapy with other physical therapies.

NONOPIOIDS ANALGESICS: ACETAMINOPHEN AND NSAIDs

If patient is having mild to moderate pain then a short course of 5–7 days with Acetaminophen or NSAIDs could be advised if there are no contraindications. Acetaminophen, i.e. Paracetamol is a non-NSAID centrally acting pain killer unlike other NSAID which are peripherally acting. Besides paracetamol aspirin, NSAIDs or cyclo-oxygenase-2 selective inhibitors (coxibs) are the commonly available nonopioid analgesics **(Table 4.3)**.

Table 4.3 Commonly used nonopioid analgesics[1]

Drug	*Strength and maximum dose with dosage*	*Route*	*Side effects*
Paracetamol	250 mg, 500 mg, 650 mg,1000 mg, 4 g/day QID dose	Oral/IM/IV/ Rectal	Allergic reactions, GI upset, Hepatic dysfunction, sweating episodes
Aspirin	75 mg, 100 mg, 150 mg, 325 mg, 2 g/day QID dose	Oral	Allergic reactions, GI upset, Renal dysfunction, CNS toxicity, Platelet inhibition
Ibuprofen	200 mg, 400 mg, 600 mg, max dose 1 g to 2 g/day TID	Oral	Allergic reactions, GI effects (Nausea, vomiting, diarrhea), renal dysfunction, dizziness, platelet inhibition, hypertension, cardiac failure, asthma or even decreased bone healing
Diclofenac	50 mg, 100 mg, 150 mg, max dose of 150 mg/day TID dose	Oral/IM/ IV/ Rectal/ Transdermal	Same as Ibuprofen
Acelofenac	100 mg, 200 mg, max dose of 200 mg/day BD dose	Oral	Same as Ibuprofen

Contd...

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Contd...

Drug	*Strength and maximum dose with dosage*	*Route*	*Side effects*
Etoricoxib	60 mg, 90 mg, 120 mg, max dose of 120 mg/day OD	Oral	Same as Ibuprofen, caution in old patient with IHD
Piroxicam	20 mg, max dose of 20 mg/day OD or 3 divided dosage	IM/Oral/ Submucous	Same as Ibuprofen
Ketorolac	10 mg oral tablet 30 mg injection, max dose of 90 mg/day QID dose	IM/IV	Same as Ibuprofen, only for a short course of 2–3 day
Naprosyn	250 mg, 500 mg, 750 mg, Max dose of 1 g/day TID dose	Oral	Same as Ibuprofen, avoid in children
Indomethacin	50 mg, 75 mg, 100 mg, Max dose of 100–200 mg/day TID dose	Oral	Same as Ibuprofen, only if other NSAIDs are not working except in hemicranias continua or arthritis
Flupirtine	50 mg, 75 mg, 100 mg, 150 mg, OD to Four times a day	Oral/Rectal	Watch for nausea or vomiting, colic diarrhea, constipation, funny feelings allergy

Important tips for Paracetamol use:

- Paracetamol is very effective in mild to moderate pain as a standalone pain killer in the dosage 3–4 g/day in 3–4 divided dose
- The combination of Paracetamol and NSAID are commonly used and it is claimed that the combination is more effective than the individual medication for moderate to severe pain
- Paracetamol is also an effective adjunct to opioid analgesia, opioid requirements being reduced by 20–30% when combined with a regular regimen of oral or rectal paracetamol
- Paracetamol should be used with caution or in reduced doses in patients with active liver disease, history of heavy alcohol intake and glucose-6-phosphate dehydrogenase deficiency.

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- Cautious for long-term (more than 6 weeks), does not rule out gastric side effects
- Avoid with Aspirin, Barbiturates and alcohol.

Using NSAIDs

NSAIDs commonly used are Diclofenac, Piroxicam, Etoricoxib, Ketoprofen and Ibuprofen.

High-risk Patients for NSAIDs Prescription
Avoid NSAIDs in following patients:

- Patient with age more than 65 years
- Patient with acid peptic disease
- Patient with ulcerative colitis
- Patient with borderline renal function or having renal dysfunction
- Patient with recent Myocardial infarction or cardiac failure
- Patient with uncontrolled hypertension
- Patient having diabetes since a long time or uncontrolled disease
- Patient with sepsis or unstable hemodynamic state
- Patient with allergy to NSAIDs
- Patients with bronchial asthma
- Pregnant or breast feeding patient.

Tips for NSAIDs prescription:

- Avoid in above mentioned patients
- Always adhere to the prescribed dose limit
- Although complications of NSAID are dose related even smaller dosage in high-risk patients can cause side effects
- Even if some patients COX-2 selective might be better still side effect profile of COX-2 selective drugs remains same as non-selective
- Know all other pain killers that patient is taking for safer prescription
- Restrict NSAID's prescription duration to 7–10 days at the most in younger patients who are less than 60 years and avoid in above 60 years of age patients
- If you are planning NSAID for long-term (more than 6 weeks) then get baseline hemoglobin and fecal occult blood and it should be repeated after 3 month in high-risk patients
- For low-risk patients hemoglobin and fecal occult blood should be repeated every 6 months
- Patients with high-risk for renal dysfunction every 3 month one can repeat renal functions
- If patients is more than 60 years restrict NSAID to 5 days

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- Always combine with other pain meds like Paracetamol or Tramadol or Opioid or adjuvants to minimize high dosage of NSAIDs and its related side effects
- Adding nonpharmacological method like ice pack or hot fomentation, physical modalities like TENS or ultrasound, etc. would also add to the patient's pain relief and decrease NSAIDs requirement
- If at all fecal occult blood is positive or hemoglobin comes down immediately stop NSAID and check endoscopy should be advised.

After prescribing NSAIDs one should be vigilant of following symptom which might warrant immediate stoppage of NSAID especially if prescription would be a long-term one:

- Nausea, vomiting, diarrhea (might be due to GI side effect or renal)
- Oliguria or Anuria (renal side effect)
- Itching or skin eruptions over body (Allergic reaction)
- Breathlessness or chest pain (asthma, ischemic heart disease (IHD) or hypertension)
- Dizziness or severe headache (hypertension)

OPIOID ANALGESICS

Opioids (*details of this is also given in Chapter 5, Page 79*) are one of the most effective pain killers of today. It should be used if one has ready access to its antidote like Naloxone, etc. If one is not sure of how to use opioids effectively for pain relief, refer them to proper specialists to prevent tolerance and dependence to opioids in patients. Opioid drugs available in India for pain managements:

- Buprenorphine (IV/IM/Intranasal/Transdermal)
- Pentazocine (IM/IV)
- Pethidine (IM/IV)
- Codeine (Oral)
- Fentanyl (IV/IM/Transdermal/Submucous)
- Sufentanil (IV/IM)
- Morphine (Oral/IV/IM/Epidural/Intrathecal)
- Tramadol (Oral/IV/IM)
- Tapentadol (Oral)

As advised in **Table 4.1,** opioid analgesic could be used for pain relief depending on the severity of the pain. Patients should be assessed systematically for adverse effects during opioid therapy. They might even be fatal. If these are present it should be attended

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and treated with appropriate therapies. The most common adverse effects of opioids are, remedy for them is mentioned in bracket:

- Nausea and vomiting (control by antiemetic)
- Bloated feeling or paralytic ileus (prokinetic can be advised or stop or decrease opioid)
- Pruritus (control by antihistaminic or antidote to opioid)
- Constipation (bulk purgatives or laxatives)
- Sedation (minimizing dosage to avoid sedation)
- Breathing difficulty and respiratory depression (antidote to opioid and oxygen to counter respiratory issues)
- Allergic reactions (stop medication).

One of the most dangerous adverse effects of opioid analgesics is respiratory depression. Assessment of the patient's respiratory status should be performed regularly particularly during the first 24 hours of opioid therapy.

Antidote for Opioid Respiratory Depression: If respiratory depression develops proper administration of the μ receptor antagonist Naloxone will reverse the sedating and respiratory depressant effects of μ receptor agonist opioids. The aim of treatment with Naloxone is to reverse respiratory depression and sedation without reversing analgesia.

LOCAL ANESTHETICS

Commonly used Local anesthetics are Lignocaine, Bupivacaine, Levobupivacaine and Ropivacaine. These medications should be used only in supervised atmosphere where resuscitation facilities are available and by people trained to handle these medications.

Adverse Effects of Local Anesthetics

Side effects can occur with local anesthetics and are usually dose-related **(Table 4.4)**. Anaphylaxis is a life-threatening side effect which is known to be associated with local anaesthetic. Others include sensory and motor deficits (it is actually clinical effect of the local anesthetics) when these agents are administered regionally or intrathecally beyond their pharmacological half life in humans. Neurologic or mental status change may signify systemic toxicity

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Table 4.4 Dosage of commonly available local anesthetic and comparative safety to others

Local anesthetics	*Maximum single dose*	*Comments*
Lignocaine	5 mg/kg can be increased to 7 mg/kg	Cardiac depressant at higher doses
Bupivacaine	2.5 mg/kg	More cardiac depressant than lignocaine
Levobupivacaine	2.5 mg/kg	Less cardiotoxic than bupivacaine
Ropivacaine	2.5–3.0 mg/kg	Less cardiotoxic than bupivacaine and levobupivacaine

from increasing blood levels of medication. Dizziness, confusion, circumoral numbness, metallic taste, and seizures are some of the signs that suggest neurotoxicity. Potential cardiovascular reactions include dysrhythmias, hypotension, and if severe cardiovascular collapse. Allergic reactions like anaphylaxis to local anesthetics can occur but are rare.

- Anaphylaxis
- Nervous system side effects:
  - Dizziness
  - Confusion
  - Metallic taste
  - Circumoral numbness (one of the earliest sign of local anesthetic toxicity)
  - Seizure
- Cardiovascular side effects
  - Hypotension
  - Dysrhythmia
  - Cardiac arrest.

COANALGESICS

The drug that has a primary indication other than pain, but is analgesic in some painful conditions is classified as Co-analgesic.[2,4] Coanalgesic means additional pain medication which will decrease pain by directly acting on the central pain areas and neuropathic pain production sites. Commonly used medications are amitriptyline, pregabalin or specialized medications like ketamine or alcohol or phenol.

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Following are specialized medications which are beyond the scope of this chapter and handbook and they should be under guidance of a specialist especially medications like Ketamine, Clonidine, alcohol or phenol. Indications to use these medications are fairly limited. They would be used only for *Neuropathic pain* or *Cancer pain* conditions.

- *Antidepressants:* Helpful in chronic pain especially of neuropathic pain origin.
  - Amitriptyline 10 mg–75 mg in two divided or only night dose
  - Nortriptyline 10 mg–75 mg in two divided or only night dose
- *Anticonvulsants:* Helpful in neuropathic pain along with chronic pain. It should be started in patient with moderate to severe pain.
  - Pregabalin 75 mg–600 mg/day in two divided dosage
  - Gabapentin 100–2400 mg/day in two or three divided dosage
  - Topiramate 25 mg–75 mg/day in one to two divided dosage.
- *NMDA-receptor antagonists:* Ketamine:
  - It is a potent anesthetic and analgesic
  - It should only be used by specialists like pain physicians or anesthesiologists
  - In pain management it is used for Burns pain, resistant neuropathic pain conditions like restless leg syndrome, phantom pain, neuralgias, etc.
  - It is usually used in the hospital setting or ICU for neuropathic pain with bolus dose of 1 mg/kg along with a sedative like midazolam bolus and maintenance could be 4–6 mg/kg/day for IV infusion
  - Orally also it has been used for resistant painful conditions in the dose of 5–10 mg/kg/day in 2–3 divided dosage
  - Commonly occurring troubling side effects are:
    - *Cardiac response:* Tachycardia, hypertension, arrhythmia, flushing, puffiness, etc.
    - *Neurological response:* Restlessness, confusion, hallucinations, dizziness, blurred vision, improper walking, etc.
- Alpha-2 agonists—Clonidine (IV or oral or Spinal or Epidural) 100ug bid and Dexmedetomidine IV
- Neurolytic agents—Alcohol, Phenol, usually used for interventional pain procedures like celiac plexus or sympathetic chain neurolysis.

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ADJUVANT MEDICATIONS[3,4]

"Adjuvants" are not considered as true analgesics but were used to treat either a cause or contributing factor to pain or to minimize side effects of medications. So it works more like an assistant which is different than coanalgesic. For example: In a case of lumbar prolapsed intervertebral disc (PID) a typical prescription might have a NSAID, Steroids, Anticonvulsant, Antacid and muscle relaxant. Here main pain killers would be NSAID. Co-analgesic would be anticonvulsant steroid, while antacid and muscle relaxant would be adjuvant medication.

Commonly used adjuvants area:

- *Corticosteroids:* Reduce edema and inflammation and stabilize nerve membranes. They can be useful in pain due to edema (e.g. brain and spinal cord). They also alleviate nausea and improve mood and appetite. Steroid that can be used are given in previous Acute pain management chapter.
- *Muscle relaxants:* Centrally acting like Tizanidine, Chlorzoxazone and Baclofen. Baclofen is given in cases of Spasticity while other medications can be given for myofascial pain
  - *Tizanidine:* PO 2–4 mg twice to thrice daily
  - *Chlorzoxazone:* PO 250–750 mg twice to thrice daily
  - *Cyclobenzaprine:* PO 5 mg two to four times a day
  - *Eperisone:* 50 mg PO twice to thrice daily
  - *Baclofen:* 5–30 mg PO, at night to thrice daily
- Salmon calcitonin, usually intranasal spray for bone pain, 100 μg once to twice a day nasal spray.
- Bisphosphonates—in osteoporosis and metastatic bone pain in IV Zoledronic acid 4 mg over 1 hr/month or Oral Ibandronate 150 mg/month
- *Sedatives:* Could be used as an adjunct to enhance the anti-anxiety effect for patients pain control. Commonly used sedatives are:
  - Alprazolam 0.25 mg–2 mg/day at night or twice a day
  - Clonazepam 0.5 mg–2 mg/day at night to twice a day
  - Zolpidem 5 mg–20 mg/day at night to thrice a day
- *Prokinetic:* It is used to regulate bowel movement and decrease the incidence of ileus due to narcotics along with decreasing nausea and vomiting. Commonly used prokinetic are:
  - Metoclopramide 10–30 mg/day in one to three divided dosage

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  - Cisapride 20–80 mg/day in two to four divided dosage
  - Ondansetron 4 mg–16 mg/day one to four times a day, mainly used for vomiting
- Complementary medicines, e.g. vitamins and minerals for nerve related pains and metabolic pain, nutritional supplement for cancer patients.

When to prescribe adjuvant medication

- It should be prescribed for patients with moderate to severe pain especially if it is a neuropathic pain
- Pain not getting controlled by above regular analgesics
- Too many side effects of analgesics
- Patients getting tolerant to analgesics especially opioid.

Tips for coanalgesic/adjuvant medications

- Purpose should be to decrease the pain medication requirement
- Counsel patient about each and every medication that is prescribed
- Start with smaller dose at night as some of them cause sedation, then after few days start the day dose
- Target should be at least 60% decrease in pain after starting medications (pain medications and co or adjuvant medications)
- After a week or two increase the dose if needed especially for medicines like Amitriptyline or Pregabalin
- If one has prescribed multiple adjuvants then it side effects should be explained to the patients so that if needed medications can be adjusted
- Drowsiness is not uncommon, but if it is mild to moderate continue the medicine for a week so that body get used to medicine and side effects will decrease
- Any kind of extrapyramidal reaction then one can decrease the dose or stop the culprit medications
- Most of these medications should be taken for a minimum of 4–6 weeks to know if they are working not for pain relief especially if patient is taking antidepressants or anticonvulsants
- Long-term there is possibility of weight gain and tolerance to the medications
- Dose adjustment or medication rotation could work for long-term effect of antidepressants or anticonvulsants

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Salient Features

- Chapters are written by the renowned Pain Physicians of Mumbai, under the aegis of the Society for Study of Pain, Mumbai (SSPM).
- Explains in short and simplified stepwise approach to identify and diagnose different types of pain along with stepwise direction to treat the pain.
- An effort to improve quality of care of the suffering patients.
- Useful to medical fraternity to manage any type of pain.



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