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Practice Guidelines for Pain Management

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1. Introduction

Pain is the most common symptom of any illness; the physician's therapeutic task is twofold: to discover and treat the cause of pain and to treat the pain itself, whether or not the underlying cause is treatable, to provide relief and reduce the suffering caused by pain.

The International Association for the Study of Pain (IASP) has proposed a working definition: Pain is "an unpleasant sensory and emotional experience associated with either actual or potential tissue damage, or described in terms of such damage". [(1)]

Although we use the term of pain to define all sensations that hurt or are unpleasant, actually two quite different kinds of pain exist. The first is termed nociceptive. This pain is associated with tissue damage or inflammation, so it is also called 'inflammatory pain'. The second is termed neuropathic and results from a lesion to the peripheral or central nervous systems. Many pains will have a mixed neuropathic and nociceptive etiology.

From a temporary perspective, pain can be divided in acute and chronic. Acute pain occurs after trauma, operations, or lesions of a nerve, and pain is often recurrent. Chronic pain occurs continuously for at least 3 months. It inhibits feelings, emotions, thinking and reactions. Social interactions and work are restricted to the extent that mobility and physiological functions are inhibited.

2. Pain Classification [(2)]

Acute pain –

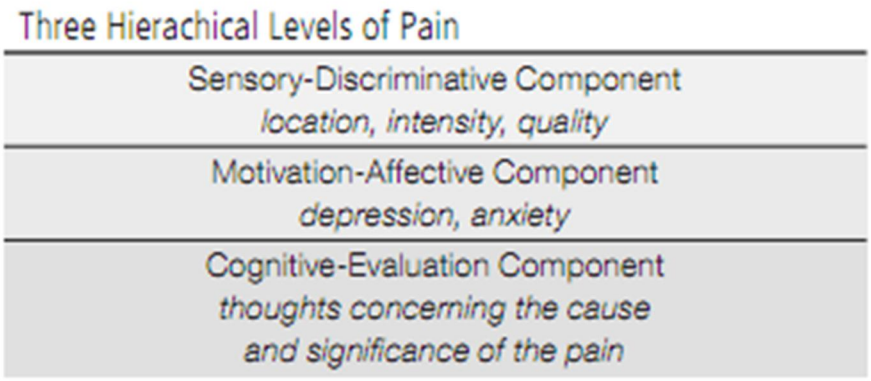
- Somatic Pain: Result of activation of nociceptors (sensory receptors) sensitive to noxious stimuli in cutaneous or deep tissues. Experienced locally and described as constant, aching and gnawing. This is the most common type in cancer patients.
- Visceral Pain: Mediated by nociceptors. It is described as deep, aching and colicky. It is poorly localized and often is referred to cutaneous sites, which may be tender. In cancer patients, results from stretching of viscera by tumor growth.

Chronic Pain Classification –

- Nociceptive pain: Visceral or somatic. Usually derived from stimulation of pain receptors. May arise from tissue inflammation, mechanical deformation, ongoing injury, or destruction. Responds well to common analgesic medications and nondrug strategies.
- Neuropathic Pain: Involves the peripheral or central nervous system. Does not respond as predictably as nociceptive pain to conventional analgesics. May respond to adjuvant analgesic drugs.
- Mixed or undetermined pathophysiology: Mixed or unknown mechanisms. Treatment is unpredictable; try various approaches.
- Psychologically based pain syndromes: Traditional analgesia is not indicated

3. Pain pathophysiology –

Pain is sometimes described in terms of three hierarchical levels: a sensory-discriminative component (e.g., location, intensity, quality), a motivational–affective component (e.g., depression, anxiety), and a cognitive-evaluative component (e.g., thoughts concerning the cause and significance of the pain). (2)



Enormous strides have been made in understanding the neurophysiology and neurochemistry of the systems that transmit and modulate information about noxious events. [3, 4]. Acute inflammation which commonly drives these neural processes has also been studied. In contrast, relatively little is known about the pathophysiology underlying most persistent pain syndromes. Nonetheless, it is now widely accepted that persistent pain may be sustained by different types of mechanisms and experts agree that clinical characteristics can be used to broadly divide pain syndromes into –

- Nociceptive
- Neuropathic

- Psychogenic
- Mixed
- Idiopathic

Although this classification is clearly an oversimplification, it has been found useful in assessment and therapeutic decision making.

Nociceptive Pain and Its Mechanisms

The nervous system responding to the innocuous sensory stimuli is different from the nervous system that alerts the brain about noxious stimuli. Nociceptive pain primarily occurs due to noxious stimuli activating the sensory system through transduction, transmission, modulation and perception; however certain neuroplastic changes like tissue sensitization also contribute nociception. In general, a noxious stimulus is evoked in response to intact thermal or chemical or mechanical nociceptors, transmitting electrical signals through normally functioning nerves.

Neuropathic Pain and Its Mechanisms –

Neuropathic pain is applied to pain syndromes inferred to result from direct injury or dysfunction of the peripheral or central nervous system. These changes may be caused by injury to either neural or non-neural tissues. Although neuropathic pain may be strongly influenced by ongoing tissue injury, or other stimuli that activate the sensory system, there is an assumption that the fundamental mechanisms sustaining the pain have become independent of any ongoing tissue injury. [5]

Neuropathic pain has varied characteristics. It may mimic the quality of somatic pain, but also is frequently described in terms that warrant the descriptor “dysesthetic:” an uncomfortable, unfamiliar sensation such as burning, shock-like or tingling. Neuropathic pain syndromes may be associated with referred pain, allodynia (pain induced by non-noxious stimuli, e.g. light touch), hyperalgesia (increased response to a noxious stimuli), or hyperpathia (exaggerated pain responses following a stimulus, often with after sensation and intense emotional reaction).

Psychological and “Idiopathic” Pain Mechanisms –

There is an exceedingly complex relationship between the psyche and pain perception. [6] In some patients, the experience of persistent pain appears to induce disturbances in mood (reactive depression or anxiety), impaired coping (often with catastrophization), and other processes, which

in turn, appear to worsen pain and pain-related distress. Other patients have premorbid or comorbid psychosocial concerns or psychiatric disorders that are best understood as evolving in parallel to the pain. These disturbances also can contribute to the pain experience and driver pain related distress. Patients with personality disorders, substance use disorders, or mood disorders often are best served by primary treatment for the psychiatric problem at the same time that pain related interventions are offered. This array of premorbid, comorbid and reactive psychosocial disturbances is individual, complex and may occur in a shifting mix of primary and secondary concerns.

This complexity highlights the importance of psychosocial and psychiatric evaluation as a fundamental aspect of the pain assessment. All patients with persistent pain and all patients with acute pain that has been challenging to control should be evaluated for mood, status of coping and adaptation, family and social support, and a range of psychiatric disorders that may influence the experience of pain or pose targets for therapy.

4. Pain evaluation and assessment –

Regular assessment of pain leads to improved acute pain management. There is good correlation between the visual analogue and numerical rating scales. Self-reporting of pain should be used whenever appropriate as pain is by definition a subjective experience. The pain measurement tool chosen should be appropriate to the individual patient; developmental, cognitive, emotional, language and cultural factors should be considered.

Systematic evaluation of pain involves the following steps.

- **Evaluate its severity.**
- **Take a detailed history of the pain, including an assessment of its intensity and character.**
- **Evaluate the psychological state of the patient, including an assessment of mood and coping responses.**
- **Perform a physical examination, emphasizing the neurological examination.**
- **Perform an appropriate diagnostic work-up to determine the cause of the pain, which may include tumor markers.**
- **Perform radiological studies, scans, etc.**
- **Re-evaluate therapy.**

Initial Pain Assessment –

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Pain management depends on a comprehensive assessment. This is especially true for the patient with persistent pain. Pain assessment should be ongoing (occurring at regular intervals), individualized, and documented so that all involved in the patient's care have a clear understanding of the pain problem. As a result of the pain assessment, the clinician should understand the nature of the pain in terms of its etiology, pathophysiology and syndrome; its impact on many domains of life; and relevant premorbid conditions and comorbidities that will influence treatment decisions. This understanding requires detailed questions about the pain characteristics, an assessment of the impact of the pain in multiple domains, and an evaluation of related concerns and comorbidities.

Based on this information, the findings on a physical examination and review of records and existing laboratory and imaging data, a working diagnosis can be developed that includes an understanding of the pain's etiology, pathophysiology and syndrome. From this formulation, a plan of care can be developed that may include the need for additional evaluation and an initial set of therapies to address the pain and other concerns.

This process of assessment can be straightforward and brief in the setting of acute pain related to trauma or surgery. It increases in complexity and the time required as the pain becomes persistent, fails to respond to conventional therapy, or is observed to be occurring in a biomedical or psychosocial context that complicates the understanding of the pain or poses challenges in management.

Initial pain assessment guidelines [1]

- **Obtain a detailed history, including –**
  - **Assessment of the pain characteristics**
  - **Impact of the pain on multipledomains (physical, psychosocial, role functioning, work, etc.)**
  - **Related concerns and comorbidities (other symptoms, psychiatric disorders including substance use disorder, etc.)**
  - **Prior workup and working diagnosis, and prior therapies**
- **Conduct a physical examination, emphasizing the neurological and musculoskeletal examination**
- **Obtain and review past medical records and diagnostic studies**
- **Develop a formulation including**

  1) Working diagnoses for the pain etiology, pain syndrome and inferred pathophysiology

  2) Plan of care including need for additional diagnostic studies and initial treatments for the pain and related concerns

Physical Examination and Diagnostic Evaluation –

Other data also are critical to the comprehensive pain assessment. A physical examination should be done at the time of the initial pain assessment and then repeated over time as required by the clinical situation. The examination should include assessment of mental status, inspection (posture, guarding, splinting, signs of sympathetic dysfunction), vital signs, and neurological assessment, with emphasis on sensory dysfunction and musculoskeletal status.

The extent to which an underlying etiology for the pain should be sought depends on the context of the patient's illness. Laboratory and radiographic evaluation are usually appropriate in the cases of acute nonsurgical pain, and in cases of persistent pain that has not previously been adequately evaluated, or that has recently changed or is now occurring in association with an evolving disease (e.g., cancer).

However, most experts believe that repeated evaluation of the same pain in a patient with long standing persistent pain rarely yields useful results and may divert attention from symptom control and functional restoration. The guiding principle is to perform a diagnostic evaluation when information needed to establish or confirm a diagnosis is lacking, and when there is a meaningful chance that the test will both yield information and be actionable, i.e., will allow a change of therapy

Pain characteristics –

Characteristics	**Potential Elements**
Temporal	Acute, recurrent, or persistent Onset and duration Course and daily variation, including breakthrough pain
Intensity (verbal rating or 0-10 numeric scale)	Pain “on average” last day or week Pain “at its worst” last day or week Pain “at its least” last day or week Pain “right now”
Topography	Focal or multifocal Focal or referred, and specific radiation Superficial or deep
Quality	Any descriptor (e.g., aching, throbbing, stabbing or burning) Familiar or unfamiliar
Exacerbating / relieving factors	Volitional (“incident pain’) or non-volitional
From: Portenoy RK and Kanner RM, Definition and assessment of pain. In Portenoy RK and Kanner RM, eds. Pain Management: Theory and Practice, Philadelphia: F A Davis; 1996; 7.	

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Differences between acute and chronic pain –

Characteristics	**Acute pain**	**Chronic pain**
Temporal features	Recent onset and expected to last no longer than days or weeks	Remote, often ill-defined onset; duration unknown
Intensity	Variable	Variable
Associated affect	Anxiety may be prominent when pain is severe or cause is unknown; sometimes irritability	Irritability or depression
Associated pain- related behaviors	Pain behaviors (e.g., moaning, rubbing, splinting) may be prominent when pain is severe	May or may not give any indication of pain; specific behaviors (e.g., assuming a comfortable position) may occur
Associated features	May have signs of sympathetic hyperactivity when pain is severe (e.g., tachycardia, hypertension, sweating, mydriasis)	May or may not have vegetative signs such as: lassitude, anorexia, weight loss, insomia, loss of libido; these signs may be difficult to distinguish from other disease-related effects.

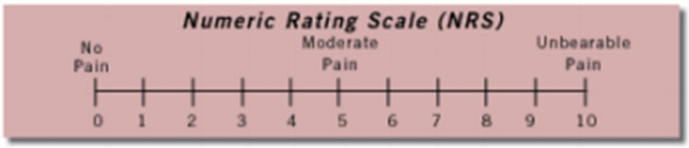
Source: Portenoy RK and Kanner RM, Definition and assessment of pain. In Portenoy RK and Kanner RM, eds. Pain Management: Theory and Practice, Philadelphia: F A Davis; 1996; 7.

Scales for pain assessment –

Unidimensional Pain Scales –

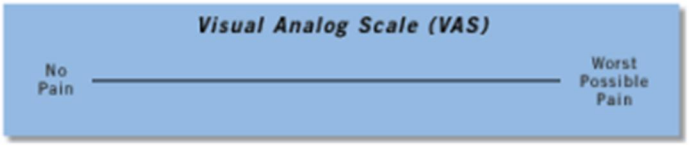
Numeric rating scale

In the clinical setting, the NRS is simple to use and is one of the most common approaches for quantifying pain. Patients indicate their pain intensity on a scale of 0 to 10, with 0 indicating no pain and 10 the worst pain imaginable.



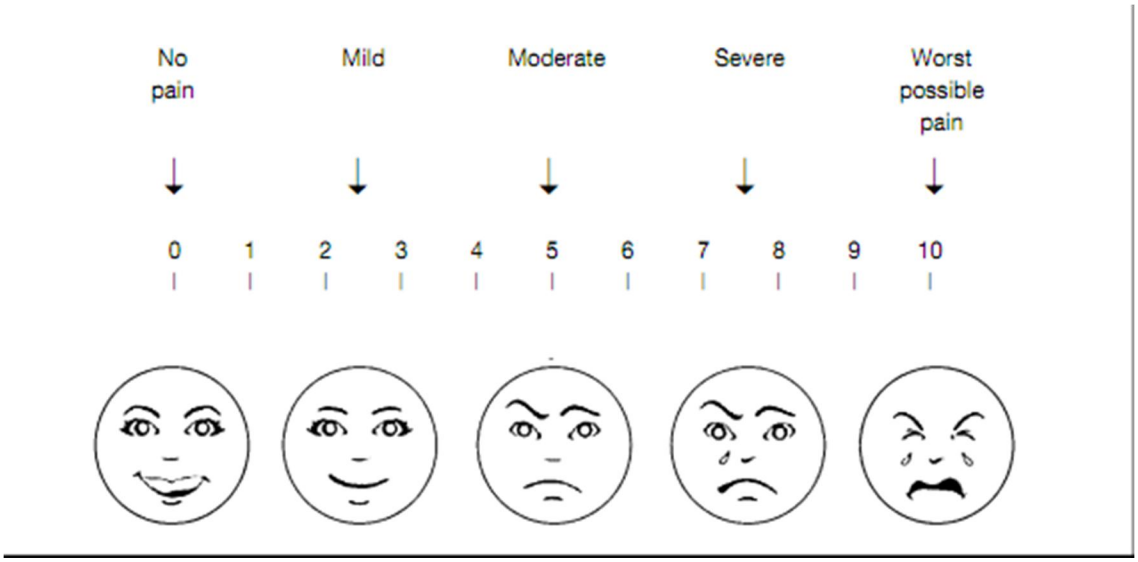
Visual analog scale

The VAS is another validated approach to pain measurement and is conceptually similar to an NRS. The most common VAS consists of a 10-cm line with one end labeled “no pain” and the other end labeled “worst pain imaginable.” The patient marks the line at the point that best describes the pain intensity.



Faces pain scale

This scale presents pictures of 6 to 8 different facial expressions depicting a range of emotions. This scale may be useful in young children, in patients who have mild to moderate cognitive impairment, or patients with other language barriers.



Multidimensional Pain Scales

Aside from brief or predictable procedure-related pain, more comprehensive pain assessment requires the determination of other characteristics of the pain, such as location and quality, and its effect on mood and function. Multidimensional pain assessment tools have been developed to quantitate these aspects of pain. They take longer to administer than the unidimensional scales and some patients who are cognitively impaired or poorly educated may find them difficult to complete. They are generally used in pain research, but can be adapted for clinical use, if appropriate and valuable.

The Brief Pain Inventory (BPI)

The BPI is a well validated multidimensional pain measurement tool with demonstrated reliability and validity in patients with cancer, AIDS, and arthritis. Taking 5 to 15 minutes to administer, it includes 4 pain intensity scales ("right now", "on average", "at its worst", and "at its least"), as well as 7 scales assessing the impact of pain on general activity, mood, ability to walk, work, relationships, sleep, and enjoyment of life. [7] Each of these items is rated on a 0-10 numeric scale. The BPI is widely used in pain research and has been translated into a large number of languages

In recent years, a number of multidimensional tools have been developed to assess specific types of pain. For example, there are now a number of instruments that screen for neuropathic pain, or assess it more fully once it is identified. An example of the latter instrument is the Neuropathic Pain Scale, [8] which like other multidimensional questionnaires is generally used in the research setting.

Initial Pain Assessment Tool –

This tool, which was developed for use in the initial patient evaluation, elicits information about characteristics of the pain, the patient's manner of expressing pain, and the effects of the pain on the patient's life (e.g., daily activities, sleep, appetite, relationships, emotions). It includes a diagram for indicating pain location(s), a scale for the patient to rate pain intensity, and a space for documenting additional comments and management plans.

McGill Pain Questionnaire (MPQ) –

The MPQ is one of the most extensively tested multidimensional scales in use. This tool assesses pain in three dimensions (i.e., sensory, affective, and evaluative) based on words that patients select to describe their pain. The MPQ can be combined with other tools to improve diagnostic accuracy. A briefer form of the MPQ, the short-form McGill Pain Questionnaire, is also available.

5. Pain management –

No single treatment approach manages all types of pain for all categories of patients under all clinical conditions. A physician attempting to treat a pain must consider various available options to control pain. An effective pain management plan requires a multi-disciplinary approach with clear understanding on pharmacological, non pharmacological treatment procedures, adverse effects associated with prescribed drugs, and how these differs from patient to patient.

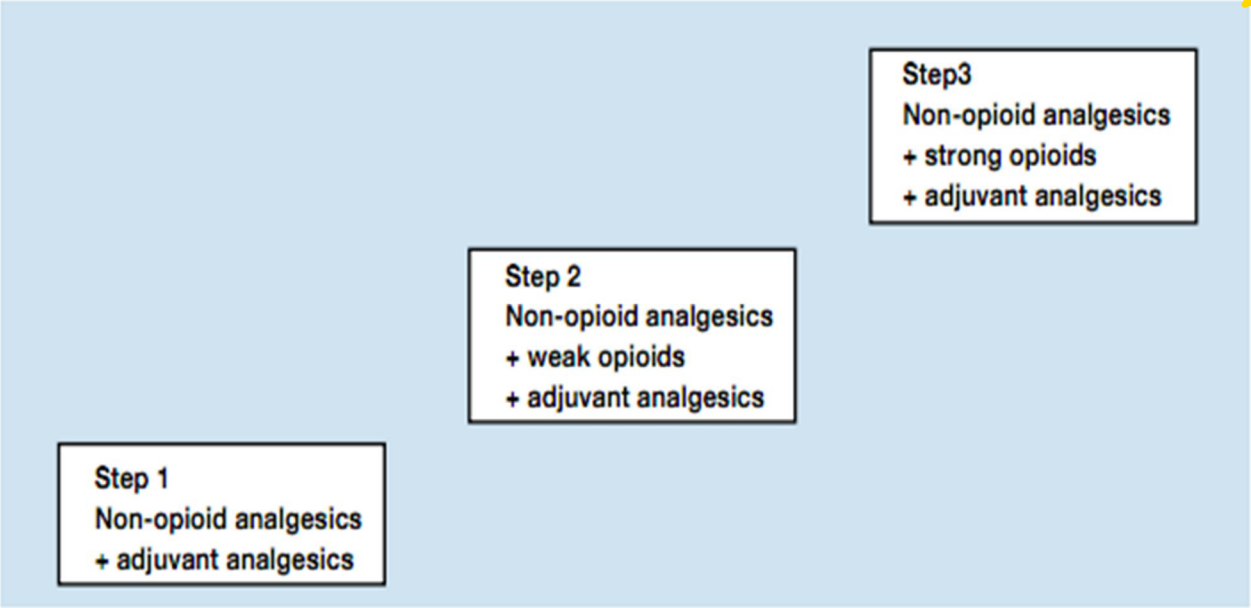


Figure WHO Ladder for Pain Management [9]

Step 1

Patients with mild to moderate cancer-related pain should be treated with a non-opioid analgesic, which should be combined with an adjuvant analgesic if a specific indication for one exists.

Step 2

Patients who present with moderate to severe pain, or who fail to achieve adequate relief after a trial of non-opioid analgesics, should be treated with a weak opioid (codeine, tramadol). This treatment is typically accomplished using a combination product containing a non-opioid (e.g. aspirin or paracetamol) and an opioid (such as codeine, oxycodone or propoxyphene). This drug can also be co-administered with an adjuvant analgesic.

Step 3

Patients who present with severe pain, or who fail to achieve adequate relief following appropriate administration of drugs on the second rung of the ‘analgesic ladder’, should receive a strong opioid, such as morphine or hydromorphone. This drug may also be combined with a non-opioid analgesic or an adjuvant drug.

a. Acute pain management –

i. Pharmacologic treatment

Pharmacologic treatment is the mainstay of pain therapy. Almost half of individuals who suffer from pain choose a nonprescription analgesic as their initial choice for pain relief. As with types of pain, multiple systems for classifying analgesics exist. In the below system, analgesics are broadly categorized as [(10)]:

- Opioid analgesics (opioids): mu opioid agonists (i.e., morphine-like agonists) and agonist-antagonist opioids
- Nonopioid analgesics (nonopioids): paracetamol and nonsteroidal anti-inflammatory drugs (NSAIDs), including aspirin and other salicylic acid derivatives
- Adjuvant analgesics or co-analgesics: a diverse group of drugs, with primary indications for conditions other than pain, with analgesic properties relevant to some conditions.
- Commonly used adjuvant analgesics include antiepileptic drugs (AEDs), tricyclic antidepressants (TCAs), and local anesthetics (LAs).

Opioids

Dextropropoxyphene has low analgesic efficacy. Tramadol is an effective treatment for neuropathic pain. Gabapentin, non-steroidal NSAIDs and ketamine are opioid-sparing medications and reduce opioid-related side effects. In appropriate doses, droperidol, metoclopramide, ondansetron, tropisetron, dolasetron, dexamethasone, cyclizine and granisetron are effective in the prevention of postoperative nausea and vomiting. Tramadol has a lower risk of respiratory depression and impairs gastrointestinal motor function less than other opioids at equianalgesic doses. Pethidine is not superior to morphine in treatment of pain of renal or biliary colic. Morphine-6-glucuronide is an effective analgesic. In the management of acute pain, one opioid is not superior over others but some opioids are better in some patients.

Paracetamol, non-selective non-steroidal anti-inflammatory drugs and coxibs

Paracetamol is an effective analgesic for acute pain; the incidence of adverse effects comparable to placebo. Non-selective NSAIDs are effective in the treatment of acute postoperative and low back pain, renal colic and primary dysmenorrhoea. Coxibs are effective in the treatment of acute

postoperative pain. Non-selective NSAIDs given in addition to Paracetamol improve analgesia compared with Paracetamol alone. Paracetamol given in addition to PCA opioids reduces opioid consumption.

NMDA-receptor antagonists

Perioperative low-dose ketamine used in conjunction with patient-controlled analgesia morphine is opioid-sparing and reduces the incidence of nausea and vomiting. In general, a perioperative low-dose ketamine infusion is opioid-sparing, but does not produce a clinically significant reduction in pain scores or opioid-related adverse effects.

Glucocorticoids

Dexamethasone, compared with placebo, reduces postoperative pain, nausea and vomiting, and fatigue

Parenteral analgesics -

Paracetamol combined with codeine is more effective than either drug alone and shows a dose-response effect. NSAIDs (both non-selective NSAIDs and coxibs) given parenterally or rectally are not more effective and do not result in fewer side effects than the same drug given orally. Paracetamol combined with tramadol is more effective than either drug alone and shows a dose-response effect. Early postoperative oral administration of paracetamol results in highly variable plasma concentrations that may remain subtherapeutic in some patients. Rectal administration of single doses of paracetamol results in highly variable plasma concentrations that often remain subtherapeutic.

Day-stay or short-stay surgery –

Infiltration of the wound with local anesthetic agents provides good and long-lasting analgesia after ambulatory surgery. Peripheral nerve blocks with long-acting local anesthetic agents provide long-lasting postoperative analgesia after ambulatory surgery.

Single shot infraclavicular blocks provide effective analgesia and less nausea following hand and wrist surgery and earlier ambulation and hospital discharge compared with general anesthesia. Continuous peripheral nerve blocks provide extended analgesia after ambulatory surgery, leading to

reduced Opioid requirements, less sleep disturbance, earlier achievement of discharge criteria an improved rehabilitation. Continuous peripheral nerve blocks have been shown to be safe at home, if adequate resources and patient education are provided. Pain relief after ambulatory surgery remains poor and is a common cause of unplanned readmissions.

Multimodal analgesia -

Recent research on postoperative pain management supports a treatment approach known as "multimodal analgesia" or "balanced analgesia." This approach involves the use of more than one method or modality of controlling pain (e.g., drugs from two or more classes, drug plus nondrug treatment) to obtain additive beneficial effects reduce side effects, or both.

These modalities may operate through different mechanisms or at different sites (i.e., peripheral versus central actions). One example of multimodal analgesia is the use of various combinations of opioids and local anesthetics to manage postoperative pain [11]

Examples of multimodal analgesia

Systemic NSAID + systemic opioid

Systemic NSAID + epidural opioid and local anesthetic

Systemic NSAID + local infiltration of anesthetic + systemic opioid

Regional block + systemic NSAID + epidural opioid and local anesthetic

The multimodal analgesia in postoperative patients had shown benefits like earlier oral intake, ambulation, quick recovery and hospital discharge. It also improved the patient participation in activities like physical therapy, which is essential for fast recovery. Other advantages of the multimodal approach include reduced postoperative morbidity, mortality, and cost. [11]

Preemptive analgesia

One or more analgesic(s) administered previous to a noxious event (like surgery) helps in preventing peripheral and central sensitization and in reducing post-injury pain. Such an approach of preventing a pain is referred as preemptive analgesia. The efficacy of preemptive analgesia had been promising in animal models; some human studies also showed significant results. For example, in one study of spinal fusion surgery, the preoperative administration of selective

cyclooxygenase-2 (COX-2) inhibitors resulted in decreased use of morphine. Also the preoperativ epidural blockade showed decreased incidence of phantom limb pain in patients who underwent limb amputation. However, other studies failed to prove the effectiveness of preemptive analgesia in preventing limb pain. Moreover a recent review of 40 controlled clinical studies reported that preemptive analgesia with a variety of drugs had no significant difference in the intensity and duration of postoperative pain. This study presented the necessity to identify the optimum method or timing for initiating analgesia. A preemptive analgesic effect may be influenced by multiple factors like choice of drug, nature and degree of tissue damage, duration of the surgery, time and route of administration, time period for central sensitization. [11]

ii. Post operative pain [12]:

Post-operative pain is defined as an expected, inevitable symptom in a surgical patient associated with surgical tissue damage, the presence of drains and tubes, post-operative complications or a combination of the above. Post-operative pain is usually underestimated and undertreated. Approximately 70% of surgical patients experience a certain degree (moderate, severe or extreme) of post-operative pain. The results of post-operative pain under treatment include increased morbidity and mortality, mostly due to respiratory and thromboembolic complications, increased hospital stay, impaired quality of life, and development of chronic pain.

The aim of the post-operative pain guidelines is to establish safer and more effective pain management, to introduce proper assessment of pain and planning of pain control techniques, and to promote training of medical and nursing staff in this area.

Postoperative pain management should be the part of surgeon's initial review of all aspects of the planned procedures. The surgeon should plan the postoperative pain management along with other aspects of the planned surgical procedures.

The patient pain history should be obtained by anesthesiologist. Preoperative pain assessment and measurement by appropriate pain tools should be carried out. Preoperative cognitive behavioral interventions should be implemented with an objective to reduce pain, anxiety and the amount of medicines required for pain control. Preoperative cognitive behavioral techniques include relaxation, distraction, and imagery. Preparing the patient with preoperative pain approaches helps in reducing the amount of analgesia required postoperatively.

The drugs should be administered as per the pharmacokinetic and pharmacodynamic properties. The type, dose and route of administration of the drug should be discussed with the patient and planned as per the three steps of WHO ladder. For intravenous administration, the analgesics should not be used without a venous line flux control essentially when opioids are used.

Pharmacological therapy for post operative analgesia –

NSAIDs –

NSAIDs are the most commonly used postoperative analgesic drugs, which include non-selective cyclo-oxygenase (COX) inhibitors (e.g. aspirin, diclofenac and ibuprofen) and newer COX 2 selective inhibitors (rofecoxib and celecoxib). These drugs inhibit COX and reduce the production of prostaglandins. The COX 2 inhibitors show fewer gastric side effects (like ulcers and gastric bleeding) and no analgesics related effects of respiratory depression or sedation. These drugs can be given orally, intravenously, or intramusculary 'as needed' or 'around-the clock'.

Paracetamol and its combinations with codeine and dihydrocodeine have been widely considered for the treatment of postoperative pain. No clear mechanism of action is known for the paracetemol, however it is supposed to act by inhibiting centrally produced COX. Paracetamol can be combined with weak opioids like codeine, dihydrocodeine or dextropropoxyphene and tramadol.

Opioids –

Tramadol is a weak opioid analgesic commonly used for controlling postoperative pain. It can be given orally or intravenously. Tramadol acts as an opioid agonist on the μ receptor and it is an inhibitor of noradrenaline and serotonin reuptake in descending pain inhibitory pathways. Tramadol in combination with Paracetamol shows efficacy comparable to ibuprofen.

Opioids are the first choice of drugs for severe acute pain after surgery and can be administered orally, intravenously, intramuscularly or subcutaneously. The systemic opioids administration involves the traditional 'as needed' schedule or 'around-the-clock' dosing. Safe and effective use of opioids can be achieved by titrating the dose against the required effect of pain relief and reduce the unwanted effects.

Oral route of administration is more feasible, easy and effective. While subcutaneous route of administering opioids is comparable to intravenous. The major side effect is respiratory depression,

while hypotension, sleepiness, nausea and constipation are the minor complications associated with opioids.

Fentanyl has been administered transdermally for post-operative pain management, but its use by this route has been limited by the difficulty of titrating the drug levels. The fentanyl HCl iontophoretic transdermal system (fentanyl ITS) is a needle-free patient-controlled system that releases a pre-programmed dose of fentanyl on demand. It is very effective in the management of severe post-operative pain.

Epidural analgesia –

These are supposed to produce superior analgesia than PCA and other analgesic techniques like intermittent intramuscular opioids. The continuous epidural infusion of local anaesthetics (bupivacaine/marcaine) and opioids (morphine or diamorphine) have been shown to reduce effectively the postoperative pain. Moreover the epidurals significantly decrease the stress response to surgery, surgical morbidity, and incidence of postoperative pulmonary complications, cardiac complications and of paralytic ileus. The potential adverse effects associated with epidural infusion include hypotension, respiratory depression, very low incidence of neurological damage (<1: 20,000) and infection (<1: 10,000).

Patient-controlled epidural analgesia (PCEA)

Patient-controlled epidural analgesia has become very common because it allows individualization of analgesic requirements, a decrease in the use of drugs, greater patient satisfaction and superior analgesia. In addition, PCEA seems to provide better analgesia compared with intravenous PCA

Wound infiltration

Intra-operative wound infiltration with local anesthetic (usually 10-20 mL of ropivacaine or bupivacaine 0.25-0.5%) can provide some post-operative analgesia and may reduce the requirement for systematic analgesia

Continuous wound instillation

Continuous post-operative wound instillation of a local anesthetic via a multi-hole catheter placed intraoperatively by the surgeon has been proven to provide satisfactory analgesia for moderate to severe postoperative pain, reducing the consumption of systemic analgesics

b. Chronic pain management [13] –

Chronic pain assessment should include determining the mechanisms of pain through documentation of pain location, intensity, quality and onset/duration; functional ability and goals; and psychological/social factors such as depression or substance abuse. The goal of treatment is an emphasis on improving function through the development of long-term self-management skills including fitness and a healthy lifestyle in the face of pain that may persist. Medications are not the sole focus of treatment in managing pain and should be used when needed to meet overall goals of therapy in conjunction with other treatment modalities.

Chronic pain is resistant to most of the treatments and significantly affects the quality of life of the individual by accompanying depression, sleep disturbances and anxiety disorders. Although there has been a significant improvement in pain management, chronic pain still remains a major problem. A person suffering with pain may have two or more co-existing chronic conditions which can include chronic fatigue syndrome, temporomandibular joint dysfunction, fibromyalgia, inflammatory bowel disease, endometriosis, interstitial cystitis and vulvodynia.

Psychological factors may influence the experience, report and display of pain. Identification and management of comorbid psychological disorders will facilitate appropriate biopsychosocial care. Unmanaged disorders may interfere with the patient's ability to meaningfully participate in a collaborative plan of care and likely diminish treatment effectiveness. Depression, anxiety and substance abuse or dependence are likely psychiatric comorbidities.

Pharmacological management of chronic pain –

Non opioids analgesics –

Non-opioid analgesics to consider for use in the treatment of chronic pain include Paracetamol and nonsteroidal anti-inflammatory drugs (NSAIDs). Paracetamol is an analgesic that may be used initially for the treatment of mild chronic pain or to supplement other agents in treating mild to moderate pain. It lacks anti-inflammatory effects, but is generally well tolerated at therapeutic doses. It does not damage the gastric mucosa but may have chronic renal or hepatic adverse effects. Dosage should be restricted to a maximum of 4 grams per 24 hours, including Paracetamol

contained in combination opioid products such as hydrocodone with Paracetamol. Paracetamol should be used cautiously or avoided in patients with liver impairment.

Non-steroidal anti-inflammatory drugs (NSAIDs) –

NSAIDs are indicated for the treatment of mild to moderate inflammatory or non-neuropathic pain.

- All NSAIDs inhibit the enzyme cyclooxygenase (COX), inhibiting prostaglandin synthesis.
- All NSAIDs have GI risks of gastritis and possible bleeding. Risk benefits should be weighed, especially when treating elderly patients or those at higher risk for GI adverse effects.
- NSAIDs should be used with caution in patients with coagulopathies or thrombocytopenia and those at risk for bleeding.
- Chronic NSAID use increases the risk of renal insufficiency, especially those with diabetes, and patients should be monitored for signs of reduced renal function and hypertension.
- Ketorolac should not be used for longer than five days and therefore is not an appropriate choice of NSAID in the treatment of chronic pain.
- NSAIDs have significant opioid dose-sparing properties and in turn may reduce opioid-related side effects. All NSAID use should be monitored including patient use of non-prescription drugs, to prevent duplication of therapy and adverse effects.

Opioids –

It is appropriate to consider opioid therapy for patients with persistent moderate to severe pain where clinical evidence suggests opioids are likely to be effective in neuropathic pain that is not responsive to initial therapies (TCAs or gabapentin). Opioids are rarely beneficial in the treatment of inflammatory or mechanical/compressive pain and are not indicated for chronic use in treatment of headache. Opioid therapy is considered part of the overall management for the pain syndrome.

The Four A's

The goal of opioid therapy is to provide partial analgesia, and maintain or improve function with acceptable side effects. (Four A's: Analgesia, Adverse drug effects, Activity, Adherence).

Tricyclic Antidepressants (TCAs) –

Tricyclic antidepressants have a role in the treatment of neuropathic pain, especially if the patient has co-existing insomnia, anxiety or depression. TCAs are categorized as secondary amines (nortriptyline or desipramine) or tertiary amines (amitriptyline and imipramine). Both classes are effective in the treatment of neuropathic pain, but the tertiary amines have more anticholinergic side effects and generally should be avoided in the elderly.

Anticonvulsant or Antiepileptic Drugs –

The first-generation anticonvulsants carmabazepine and phenytoin are effective in the treatment of neuropathic pain but may have unwanted CNS side effects. Carbamazepine is approved for the treatment of trigeminal neuralgia, and benefits are well established. Pregabalin is indicated for treatment of diabetic neuropathy, postherpetic neuralgia and fibromyalgia. Oxcarbazepine is chemically similar to carbamazepine and may have benefits in the treatment of neuropathic pain, including trigeminal neuralgia and diabetic neuropathy.

Topical Agents –

Topical lidocaine 5% patches are FDA approved for postherpetic neuralgia and have shown efficacy in other neuropathic pain syndromes. Systemic absorption of lidocaine is minimal, and the patch has a clean safety profile with the correct dosage schedule. Capsaicin, the active ingredient in the herbal product cayenne, is used topically to deplete the pain mediator substance-P from afferent nociceptive neurons. Topical creams and solutions have been used in treating both neuropathic pain and arthritic pain. Capsaicin should be applied for at least six weeks to see full benefits. The side effect of local burning is common and most patients become tolerant after a few days.

Muscle Relaxants and Antispasmodics –

Skeletal muscle relaxant may be useful along with analgesics for short-term management of muscle spasms and pain. There is mixed evidence supporting the use of these drugs for long-term use. Some drugs including benzodiazepines and Carisoprodol are centrally acting and carry the risk of

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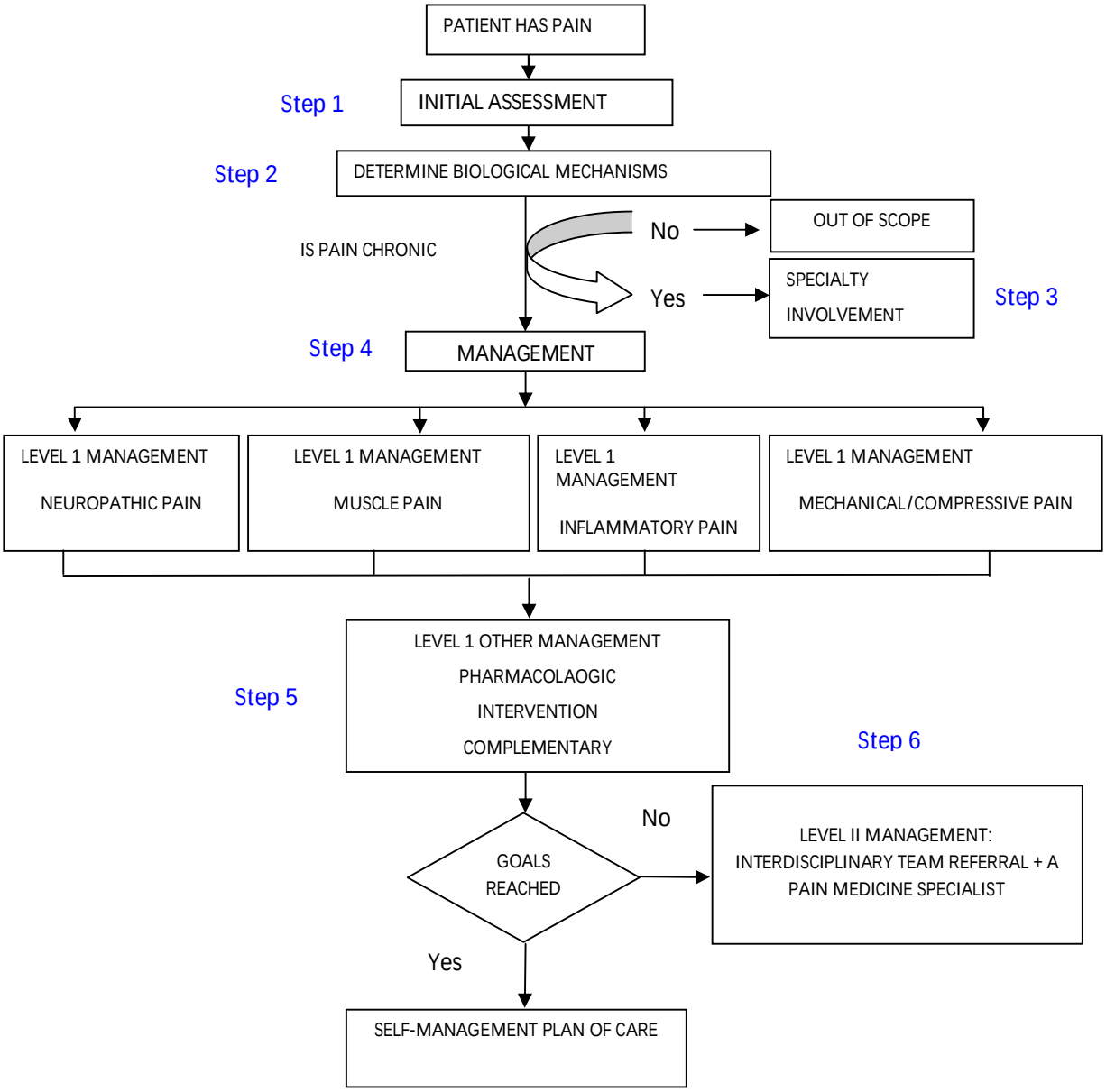
physical dependence. Muscle relaxants are more beneficial for acute short-term use and are not recommended for chronic use.

Cyclobenzaprine, which is structurally a tricyclic muscle relaxant, has shown benefits in the treatment of fibromyalgia at doses of 10 to 40 mg daily. Tizanidine is a muscle relaxant that may be used for longer periods of time due to its mechanism of action (alpha-2 sympathomimetic). It may provide benefits as an adjunct in the treatment of fibromyalgia. Baclofen may have benefits in the treatment of lancinating, paroxysmal neuropathic pain.

Anxiolytics –

Benzodiazepines are beneficial for treatment of acute anxiety and muscle spasms associated with acute pain, but have minimal benefits in treating chronic pain. Benzodiazepine side effects of sedation and respiratory depression may limit the amount of opioids that can be used safely. They also result in physical dependence when used long term.



FLOW CHART: MANAGEMENT PLAN FOR CHRONIC PAIN [13]

c. Pain management in special scenarios –

i. Acute Medical Pain [10]

Acute abdominal pain

Provision of analgesia does not interfere with the diagnostic process in acute abdominal pain. Non-selective NSAIDs, Opioids and intravenous metamizole (dipyrone) provide effective analgesia for renal colic. Non-selective NSAIDs given for renal colic reduce requirements for rescue analgesia and produce less vomiting compared with Opioids, particularly pethidine (meperidine).

Herpes zoster-associated pain

Antiviral agents started within 72 hours of onset of the herpes zoster rash accelerate the resolution of acute pain, but do not reduce the incidence of postherpetic neuralgia. Amitriptyline (used in low doses for 90 days from onset of the herpes zoster rash) reduces the incidence of postherpetic neuralgia.

Topical aspirin, topical lignocaine patch or oxycodone controlled release, provide analgesia in herpes zoster.

Acute cardiac pain

Morphine is an effective and appropriate analgesic for acute cardiac pain. Nitroglycerine is an effective and appropriate agent in the treatment of acute ischemic chest pain. The mainstay of analgesia in acute coronary syndrome is the restoration of adequate myocardial oxygenation, including the use of supplemental oxygen, nitroglycerine, beta blockers and strategies to improve coronary vascular perfusion.

Migraine

Triptans are effective in the treatment of severe migraine. Aspirin-metoclopramide is effective in the treatment of mild-to-moderate migraine Pethidine is less effective than most other migraine treatments and should not be used. Parenteral prochlorperazine, chlorpromazine or droperidol are effective in the treatment of migraine, especially in the emergency department. Paracetamol is effective in the treatment of mild-to-moderate migraine

ii. Acute Cancer Pain management–

Acute pain in patients with cancer often signals disease progression; sudden severe pain in patients with cancer should be recognized as a medical emergency and immediately assessed and treated. Cancer patients receiving controlled-release opioids need access to immediate-release opioids for breakthrough pain; if the response is insufficient after 30 to 60 minutes, administration should be repeated.

Breakthrough analgesia should be one-sixth of the total regular daily opioid dose in patients with cancer pain (except when methadone is used, because of its long and variable half life). Oral transmucosal fentanyl is effective in treating acute breakthrough pain in cancer patients. Radiotherapy and bisphosphonates are effective treatments of acute cancer pain due to bone metastases. Opioid doses for individual patients with cancer pain should be titrated to achieve maximum analgesic benefit with minimal adverse effects. Analgesic medications prescribed for cancer pain should be adjusted to alterations of pain intensity.

Causes that impair pain management in cancer patients include, paucity of residents, limited time of busy anesthesiology consultants, lack of pain education of medical residents and nurses, fear of respiratory depression and hypotension due to epidural opioids and local anesthetic infusions in the wards, lack of support during weekends and emergency hours, lack of high priority for pain management by the hospital administration, scarcity of nursing time for acute pain management services and cost of patient controlled analgesia.

There are four fundamental features that should guide the comprehensive evaluation of the patient with cancer pain. [14]

a. The patient's general medical condition and the extent of disease must be assessed.
b. Knowledge of common pain syndromes is a prerequisite for conducting a cancer pain evaluation. Common pain syndromes include but are not limited to bone metastases, abdominal (visceral) pain, neuropathic pain (e.g., peripheral neuropathies, acute herpes zoster and postherpetic neuralgia, plexopathies), and mucositis.
c. Knowledge of oncologic emergencies (e.g., hypercalcemia, spinal cord compression, cardiac tamponade, superior vena cava syndrome) is also required to conduct a comprehensive cancer pain evaluation.
d. A thorough knowledge of the modalities that can be employed in the treatment of painful crisis (i.e., pain emergency) is also necessary.

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Specific recommendations include [14] –

a. Oral medications: Oral medications such as Paracetamol, acetylsalicylic acid or other nonsteroidal antiinflammatory drugs (NSAIDs) should be employed first for mild to moderate pain.
b. If pain is not relieved or increases or if moderate pain is present at presentation, an opioid conventionally used for moderate pain (e.g., codeine, dihydrocodeine, oxycodone (compounded with a coanalgesic), or hydrocodone) should be used, usually combined with a nonopioid analgesic.
c. When increasing opioid dose, an increment of 25-50% is usually the minimum required to observe effect. If pain is not relieved, increases, or is severe at presentation, an opioid conventionally used for severe pain (e.g., morphine, hydromorphone, methadone, oxycodone (not compounded with a coanalgesic), fentanyl, or levorphanol) should be selected.

When analgesia with acceptable adverse effects is no longer attained with the oral route of administration or when oral administration is no longer viable (inability to swallow and/or absorb medication), an alternate systemic route of administration should be chosen.

a. Rectal and transdermal: Use of an alternative route of administration, specifically rectal or transdermal, should be chosen before use of invasive therapies. Rectal administration usually is considered when oral therapy is temporarily unavailable (e.g., nausea and vomiting refractory to therapy), although long-term use is effective in some patients. Transdermal fentanyl should be used in patients with stable pain states who are (1) noncompliant with oral medication, (2) unable to swallow or absorb, or (3) may benefit from a trial of fentanyl.
b. Subcutaneous and intravenous administration: The subcutaneous route of administration should be used in (1) patients unable to swallow or absorb opioids who may benefit from a continuous infusion of opioid and (2) similar patients with dynamic pain states requiring frequent "rescue" doses for breakthrough pain. Subcutaneous administration of opioids may be used in the home setting. The recommendations for intravenous administration are the same as for subcutaneous administration. Intravenous administration may be preferred when the patient has permanent venous access.

iii. Acute pain management in intensive care [10]

Observation of behavioral and physiological responses permits assessment of pain in unconscious patients. Patients should be provided with appropriate sedation and analgesia during potentially painful procedures.

Daily interruptions of sedative infusions reduce duration of ventilation and ICU stay without causing adverse psychological outcomes or increasing the risk of myocardial ischemia.

Gabapentin is more effective than carbamazepine in reducing the pain associated with Guillain-Barre syndrome. Remifentanil or remifentanil with morphine provides better analgesia than morphine alone in ventilated intensive care unit patients. The use of formal pain and agitation assessment and subsequent treatment in ventilated intensive care unit patients decreases the incidence of pain and duration of ventilation

iv. Acute pain management in emergency departments [10]

Topical local anesthetic agents (including those in liposomal formulations) or topical local anaesthetic-adrenaline agents provide effective analgesia for wound care in the emergency department.

Femoral nerve blocks in combination with intravenous opioids are superior to intravenous opioids alone in the treatment of pain from a fractured neck of femur. To ensure optimal management of acute pain, emergency departments should adopt systems to ensure adequate assessment of pain, provision of timely and appropriate analgesia, frequent monitoring and reassessment of pain.

The ideal prehospital analgesic agent should be simple to use, safe, effective, not lead to delays in transport and have a rapid onset and short duration of action so that it can be repeated as often as necessary and titrated to effect for each patient. Consideration should be given to both choice of analgesic drug and route of administration.

Intravenous morphine, fentanyl and tramadol are equally effective in the prehospital setting. Nitrous oxide is an effective analgesic agent in prehospital situations. Methoxyflurane, in low concentrations, may be an effective analgesia in the hospital and prehospital setting. Ketamine provides effective analgesia in the prehospital setting.

v. Acute pain management in a pediatric patient [(10)]

Factors affecting the pharmacokinetic profile of analgesic drugs (body water and fat composition, plasma protein binding, hepatic metabolism and renal function) change rapidly during the first weeks of life. Postnatal changes in the pharmacokinetic profile of a number of analgesic drugs (eg morphine and paracetamol) resulted in significant age related changes in dose requirements during infancy and childhood. In addition, changes in nociceptive processing may have significant effects on the pharmacodynamic response to analgesics in early life.

Therefore, developmental age and not just weight should be considered when calculating analgesic dosing. Laboratory studies have demonstrated postnatal changes in the mechanism of action, analgesic efficacy, and side-effect profile of analgesics that can inform subsequent clinical trials. In addition, prolonged reductions in synaptic activity by general anesthetics and analgesics can produce unexpected neurotoxic effects, such as apoptosis, in the developing nervous system, although the clinical significance of these findings requires further research.

Following birth, even the most premature neonate responds to nociceptive stimuli. In early development more generalized reflex nociceptive responses occur in response to lower intensity stimuli. Due to the increased plasticity of the developing nervous system, pain and injury in early life may have adverse long-term consequences. Pain assessment and measurement are important components of pediatric pain management.

Pain measurement tools are available for children of all ages. Pain measurement tools must be matched to the age and development of the child, be appropriate for the clinical context and be explained and used consistently.

Procedural pain –

Sucrose reduces the behavioral response to heel-stick blood sampling in neonates. Breastfeeding or breast milk reduces measures of distress in neonates undergoing a single painful procedure compared to positioning or no intervention. EMLA® is an effective topical anesthetic for children, but amethocaine is superior for reducing needle insertion pain. Topical local anesthetic application, inhalation of nitrous oxide (50%) or the combination of both provides effective and safe analgesia for minor procedures.

Surgical pain –

Non-selective NSAIDs do not increase the risk of reoperation for bleeding after tonsillectomy in pediatric patients. Dexamethasone reduces post-tonsillectomy pain and postoperative nausea and vomiting but high doses may increase the risk of bleeding.

Paracetamol and non-selective NSAIDs are effective for moderately severe pain and decrease opioid requirements after major surgery. Safe dosing of paracetamol requires consideration of the age and body weight of the child, and the duration of therapy. Aspirin should be avoided in children, but serious adverse events after non-selective NSAIDs are rare in children over 6 months of age.

Postoperative intravenous opioid requirements vary with age in neonates, infants and children. Effective PCA prescription in children incorporates a bolus that is adequate for control of movement-related pain, and may include a low dose background infusion. Wound infiltration, peripheral nerve blocks, and caudal local anesthetic provide effective analgesia after day-case inguinal surgery. Epidural infusions of local anesthetic and systemic opioids provide similar levels of analgesia. Epidural opioids alone are less effective than local anesthetic or combinations of local anesthetic and opioid. Intrathecal opioids provide prolonged analgesia after surgery and reduce blood loss during spinal fusion.

vi. Acute pain management in a pregnant and lactating patient [(10)]

For pain management in pregnancy non-pharmacological treatment options should be considered where possible before analgesic medications are used. Use of medications for pain in pregnancy should be guided by published recommendations; ongoing analgesic use requires close liaison between the obstetrician and the medical practitioner managing the pain. NSAIDs should be used with caution in the last trimester of pregnancy and should be avoided after the thirty second week

Labor pain management –

Epidural and combined spinal-epidural analgesia provides superior pain relief for labor and delivery compared with systemic analgesics. There is no significant difference in any outcome between use of bupivacaine and ropivacaine for epidural labor analgesia. Nitrous oxide has some analgesic efficacy and is safe during labor.

Pain management during Lactation -

Prescribing medications during lactation requires consideration of possible transfer into breast milk, uptake by the baby and potential adverse effects for the baby; it should follow available prescribing guidelines. Local anesthetics, paracetamol and several non-selective NSAIDs, in particular ibuprofen, are considered to be safe in the lactating patient. Morphine and fentanyl are considered safe in the lactating patient and are preferred over Pethidine.

Pain management during Peurperium

Routine episiotomy does not reduce perineal pain. Paracetamol and non-selective NSAIDs are effective in treating perineal pain after childbirth. Paracetamol and non-selective NSAIDs are equally but only modestly effective in treating uterine pain. Topical agents may improve nipple pain, but no one treatment is superior.

vii. Acute pain management in an elderly patient [(10)]

The need to manage acute pain in the older patient is becoming more common as the population ages. Advances in anesthetic and surgical techniques mean that increasingly older patients, including patients over 100 years old, are undergoing more major surgery. Medical conditions that are more common in older people may also lead to acute pain; these include acute exacerbations of arthritis, osteoporotic fractures of the spine, cancer and pain from other acute medical conditions including ischemic heart disease, herpes zoster and peripheral vascular disease. Experimental pain thresholds to a variety of noxious stimuli are altered in older people; there is also a reduction in tolerance to pain.

PCA and epidural analgesia are more effective in older people than conventional opioid Regimens. Reported frequency and intensity of acute pain in clinical situations may be reduced in the older person. Common unidimensional self-report measures of pain can be used in the older patient in the acute pain setting; in the clinical setting, the verbal descriptor and numerical rating scales may be preferred. Undertreatment of acute pain is more likely to occur in cognitively impaired patients.

The use of nsNSAIDs and coxibs in older people requires extreme caution; paracetamol is the preferred non-opioid analgesic. The physiological changes associated with ageing are progressive. While the rate of change can vary markedly between individuals, these changes may decrease the dose (maintenance and/or bolus) of drug required for pain relief and may lead to increased accumulation of active metabolites.

The age-related decrease in opioid requirements is related more to the changes in pharmacodynamics that accompany aging than to the changes in pharmacokinetics.

viii. Acute pain management in a patient with concurrent hepatic and/or renal disease (10)

The clinical efficacy of most analgesic drugs is altered by impaired renal or hepatic function, not simply because of altered clearance of the parent drug, but also through accumulation of toxic or therapeutically active metabolites. Some analgesic agents can aggravate pre-existing renal and hepatic disease, causing direct damage and thus altering their metabolism.

Patients with renal disease

The degree to which analgesic drug regimens require alteration in patients with renal impairment depends largely on whether the drug has active metabolites that are dependent on the kidney for excretion or if the drug may further impair renal function.

Analgesics that exhibit the safest pharmacological profile in patients with renal impairment are alfentanil, buprenorphine, fentanyl, ketamine, paracetamol (except with compound analgesics) and sufentanil. None of these drugs delivers a high active metabolite load or has a significantly prolonged clearance. Amitriptyline, bupivacaine, levobupivacaine, lignocaine, ropivacaine, clonidine, gabapentin, codeine, hydromorphone, methadone, morphine and tramadol have been used in patients with renal disease but depending on the degree of impairment and, in the case of local anaesthetics, whether or not administration is prolonged, may require a reduction in dose. Levobupivacaine, with similar clearance mechanisms, and ropivacaine may be safer than bupivacaine because of a higher therapeutic ratio.

NSAIDs (both nsNSAIDs and coxibs), dextropropoxyphene and pethidine should not be used in the presence of significant renal impairment.

Patients with hepatic disease –

Not all patients with hepatic disease have impaired liver function. In patients with hepatic impairment, most analgesic drugs have reduced clearance and increased oral bioavailability, but the significance of these changes in the clinical setting has not been studied in depth.

While there are limited data, dose adjustments are usually not required for alfentanil, buprenorphine, fentanyl, morphine, oxycodone and sufentanil. Tramadol may need to be given at lower doses. Methadone should be used with caution in the presence of severe liver disease because of the potential for greatly prolonged clearance.

The clearance of local anesthetics may be significantly impaired; doses may need to be decreased if use is prolonged. Carbamazepine and valproate should be avoided in patients with severe hepatic impairment. It may be wise to reduce the dose of paracetamol in patients with significant degrees of hepatic impairment.

6. Survey of Indian doctors' perception of pain management –

Although established analgesic strategies can benefit most patients, under treatment is common. Inadequate understanding of the principles of cancer pain therapy contributes greatly to under treatment and efforts to redress this situation are both a therapeutic and an ethical imperative.

This recommendation was drawn up for the medical practitioners who deal with pain. A survey was initiated by the Indian Society of Anesthesiologists. The aim of this survey was to conduct a pan-India survey and analyze the data which could be used to develop pain management protocols relevant to Indian practice. We summarize the recommendations and alongside present the current perceptions of participants in pain management.

A total of 176 practicing doctors, specialists and super specialists responded to the survey. Of these there were 40 female participants (22.72%) and the average age of all participants was 45.03 years. Of the participants, majority possessed a post graduate degree (MD) in Anesthesiology as their highest qualification (119 of 176 or 67.61%). Among the responders a large majority worked in Metropolitan or city hospitals. (**Figure 1**)

	Percentage
Metropolitan city hospital	34.1
City hospital	35.2
Suburban hospital	13.1
Rural set up	2.8
Other	14.8

Figure: Distribution of participants in terms of institutions of attachment.

Survey results –

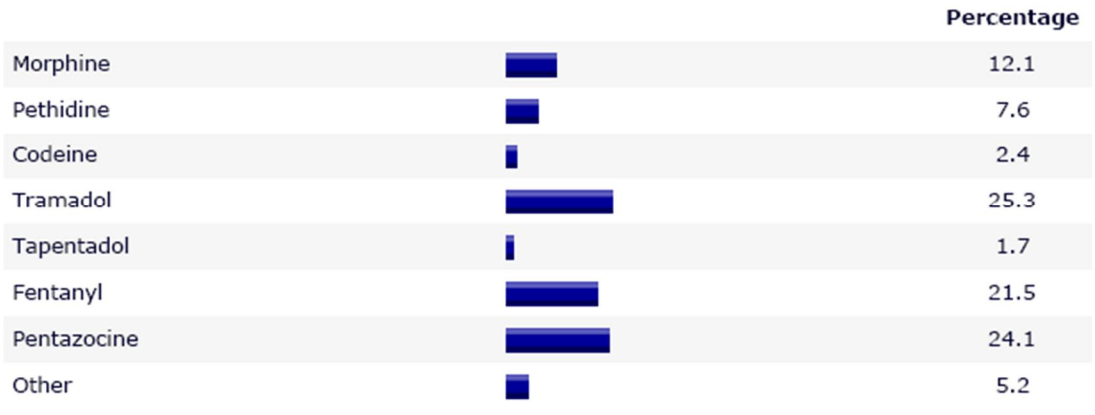
From this survey it was found that 54.5% of the responders are dissatisfied with the level and extent of pain management in their set up. Preoperative education improves patient or carer knowledge of pain and encourages a more positive attitude towards pain relief.

Postoperative pain - When asked about multimodal analgesia practices, 93.8% of the responders replied in affirmative. Further 88.2% affirmed that they had a standard pain management protocol in place that was being followed by the practitioners at their set up. Responsibility of sharing post operative pain management was divided equally among surgeons and anesthetists. The results are shown in Figure 2. Additionally 74.2% respondents said they had a dedicated team for pain management.

Figure 2 – Personnel responsible for post operative pain management.

The survey results showed that Opioids are available for post operative analgesia in most set ups (79.2% of the participants responded in affirmative to availability). However on 62.4% confirmed that their set up possessed the Narcotics Drug License.

Opioid availability at set ups are shown in Figure 3.



Day care or short surgery –

From this survey it was noted that wound infiltration by local anesthetics, peripheral nerve blocks and parenteral pain relievers are the major choices of pain relief by most of the participants. The results are depicted in Figure 4.

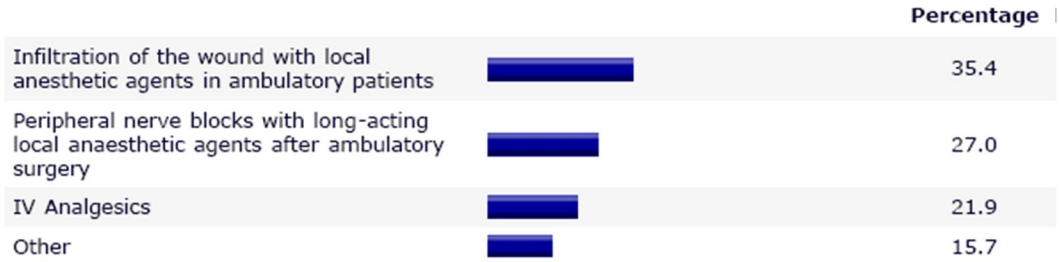


Figure 4: Preferred methods of post operative pain management after day care or short surgeries.

A majority (74.4%) of participants confirmed that they were using epidural analgesics for postoperative analgesia regularly and 68% believed epidural analgesia is one of the most reliable options compared to other parental alternatives. Further 87.6% of the participants felt that epidural clonidine or dexmedetomidine improves duration of analgesia and anesthesia when used as an adjunct to epidural local anesthetics. Nerve blocks for post operative alagesia were favored by 46.6% of the consultants in the survey.

Overall the cost of post operative analgesia that could be afforded by the set up, patient or institution was over 100 Rupees in most of the answers from the survey. The actual results are depicted in Figure 5.

Figure 5: Affordability of patients, institutions or set up for per day cost of post operative analgesia.

Dental extraction

Paracetamol 1000 mg provides safe and effective analgesia with minimal adverse effects, following dental extraction. Non-selective NSAIDs, coxibs, paracetamol, opioids or tramadol provide effective analgesia after dental extraction

When asked about the drugs preferred by the participants for post operative parenteral paracetamol was found to be the first choice of 50.9% of the participants. Among others 15.3%, 12%, 8% were found to choose Dexmedetomidine, Benzodiazepines and phenothiazines respectively. Additionally 13.8% chose other analgesic agents. Finally 89.8% of the participants believed that Paracetamol can be combined with Opioids in post operative pain to reduce the consumption and requirements for Opioids and its associated side effects. A large majority of the participants felt intravenous Paracetamol to be a good candidate for relief of milt to moderate post operative pain. (Figure 6)

Figure 6: Ratings of IV Paracetamol in treating mild to moderate postoperative pain alone or in combination

7. **General principles of pain management and recommendations summary** [(11)] –

Some principles of analgesic therapy are drug specific. However, some general principles guide all pharmacologic treatment of pain. These include –

A. Identify and treat the source of the pain - Whenever possible, identify and treat the underlying cause of the pain. However, pain management can begin before the source of the pain is determined.

B. Select the simplest approach to pain management - Although invasive methods are sometimes required, most pain can be relieved via simple methods. Cost of treatment is also a consideration in some cases.

C. Select an appropriate drug - Individualization of a pain management regimen begins with selection of an appropriate drug. These include characterization of the pain (e.g., duration, intensity, quality), characteristics of the agent (e.g., analgesic ceiling, expected time of onset and duration of analgesia, available routes of administration, dosing interval, side effects, potential for

accumulation of toxic metabolites, potential for addiction), patient factors (e.g., age, coexisting diseases, other medications, preferences, response to previous treatments).

C. Establishment of a management plan - The next step is to establish a management plan, which may include the later addition of other drugs. Use of several analgesics in combination offers several advantages. It may:

- Allow use of lower doses of some agents, thus reducing the risk of side effects
- Inhibit nociceptive processing at multiple (i.e., peripheral and central) levels, thus enhancing analgesia
- Facilitate treatment of pain in patients who do not respond to a single agent.

E. Select a route of administration - No single route of drug administration is appropriate for all clinical situations. Factors to consider include -

- Patient factors (e.g., preferences, comfort, convenience, GI function) and drug characteristics (e.g., absorption, half-life) influence the selection of an appropriate route.
- Oral administration of drugs, especially for chronic treatment, is generally preferred because it is convenient, flexible, and associated with stable drug levels.
- Although often used, IM administration has multiple disadvantages (e.g., pain, erratic absorption, fluctuating drug levels, tissue fibrosis), thus should be used sparingly.
- Intravenous (IV) administration provides a rapid onset of pain relief and, along with rectal, sublingual, and subcutaneous administration, is useful in patients who cannot take medications by mouth. Continuous infusions produce consistent drug blood levels but are expensive, require frequent professional monitoring, and may limit patient mobility.
- Transdermal administration is a convenient alternate means of continuous drug delivery that does not involve needles or pumps.
- Others like patient-controlled analgesia (PCA), intraspinal (epidural and intrathecal) drug administration (neuroaxial blockade), and other interventional techniques are also in use. PCA permits administration of a small dose of drug upon patient command and is especially useful in patients expected to require Opioids over a period that exceeds 12 hours.

- Interventional methods of analgesia include tissue infiltration (e.g., trigger point injections with local anesthetics), sensory nerve blocks, sympathetic blocks, spinal injections (e.g., epidural injections of corticosteroids, caudal blocks, nerve root injections), and continuous spinal analgesia (e.g., infusion of opioids, clonidine, baclofen). Nerve blocks can be used for diagnostic, prognostic, and therapeutic purposes.

F. Watch for and manage side effects - Patients with new or altered analgesic regimens should be observed and assessed for side effects as well as pain relief.

The general strategy to managing side effects consists of –

- Changing the dosage or route of administration (to achieve stable drugs levels),
- Trying a different drug within the same class, and/or
- Adding a drug that counteracts the effect (e.g., antihistamine for pruritus, laxative for constipation).
- Combination therapy can alleviate some side effects. For example, adding a nonopioid or adjuvant analgesic to an opioid regimen may allow use of a lower dose of the opioid. Severe side effects, on occasion, may require administration of an opioid antagonist (e.g., naloxone for opioid-induced respiratory depression).
- Use of agents with potentially hazardous metabolites (e.g., meperidine) should be restricted to short term treatment.

G. Differentiate among tolerance, physical dependence, and addiction and appropriately modify therapy. Combining opioids with nonopioids, or switching to a lower dose of another opioid, may delay the development of opioid tolerance.

H. Avoid use of placebos to treat pain - Placebo is sometimes used to assess whether pain is responsive to sympatholysis or other interventions. However, the deceptive use of placebos to treat pain is considered unethical and inappropriate

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