Section IV:

Management of Acute Pain and Chronic Noncancer Pain

A. Acute Pain

This section reviews the general approach to the treatment of acute pain, including treatment goals, therapeutic strategies, and elements of pain management. It also provides an overview (i.e., summary tables) of the treatment of some common types of acute pain.

1. Treatment Goals

As addressed in Section I.C.1, acute pain is a complex multidimensional experience that usually occurs in response to tissue trauma. Whereas responses to acute pain may be adaptive, they can have adverse physiologic and psychological consequences (e.g., reduced tidal volume, excessive stress response, progression to chronic pain, inability to comply with rehabilitation, patient suffering and dissatisfaction). Acute pain is more difficult to manage if permitted to become severe,[1] so prompt and adequate treatment of acute pain is imperative. Treatment goals and strategies for acute pain can be summarized as:

- Early intervention, with prompt adjustments in the regimen for inadequately controlled pain
- Reduction of pain to acceptable levels
- Facilitation of recovery from underlying disease or injury.

2. Therapeutic Strategies

a. 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.[2] 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.[3-5] Table 32 summarizes some specific examples of multimodal therapy.

Table 32. Examples of Multimodal Therapy

Combination of Agents	Example
Systemic NSAID[a] plus systemic opioid	PO Ibuprofen plus PO hydromorphone
Systemic NSAID plus epidural opioid and local anesthetic	IV ketorolac plus epidural fentanyl and bupivacaine
Systemic NSAID plus local infiltration of anesthetic plus systemic opioid	IV ketorolac plus lidocaine infiltration of surgical site plus IV PCA morphine
Regional block plus systemic NSAID plus epidural opioid and local anesthetic	Intraoperative anesthetic plus IV ketorolac plus postoperative fentanyl and bupivacaine epidural

Source: Reference 6.

[a]NSAIDs need to be used with care in surgical patients due to the risk of bleeding ("anti-platelet" effect).

IV: intravenous; NSAID: nonsteroidal anti-inflammatory drugs; PCA: patient-controlled analgesia; PO: per os (oral).

Benefits of multimodal analgesia include earlier oral intake, ambulation, and hospital discharge for postoperative patients as well as higher levels of participation in activities necessary for recovery (e.g., physical therapy).[6-7] It also may reduce postoperative morbidity, mortality, and costs.[8] Some pain experts advocate revision of traditional postoperative care programs to include accelerated multimodal postoperative recovery programs.[9] Additional potential applications of multimodal analgesia include other types of acute, as well as chronic, pain.[2]

b. Preemptive analgesia

Preemptive analgesia refers to the administration of one or more analgesic(s) prior to a noxious event (e.g., surgery) in an attempt to prevent peripheral and central sensitization, minimizing post-injury pain (see I.B.7,8). Compelling evidence of the efficacy of preemptive analgesia exists in animal models, and human studies have produced some promising results. For example, the preoperative administration of selective cyclooxygenase-2 (COX-2) inhibitors decreased use of morphine after spinal fusion surgery in one recent study.[10] There is also some evidence that preoperative epidural blockade (local anesthetic and opioid with or without clonidine) may reduce the incidence of phantom limb pain in patients undergoing limb amputation.[11-12]

However, other studies have failed to confirm that preemptive analgesia prevents phantom

limb pain.[a,13-14] Furthermore, a recent review of 40 controlled clinical studies revealed no difference in the intensity and duration of postoperative pain after preemptive analgesia with a variety of drugs.[15] This failure to demonstrate clinical efficacy may reflect failure to identify the optimum method or timing for instituting the analgesia. Some investigators contend that multiple factors (e.g., extent and nature of the damaged tissue, duration of the surgery, choice of drug, route and timing of administration, time course of central sensitization) may influence the ability to demonstrate a preemptive analgesic effect.[16] Thus, clinical research into its potential clinical benefits is continuing.

3. Elements of Treatment

a. Pharmacologic management

Pharmacologic management is the cornerstone of acute pain management. Multiple factors (e.g., pain intensity, quality, and pattern; patient preferences; drug side effect profiles) influence the selection of medications. Most acute pain is nociceptive and responds to nonopioids and opioids. However, some adjuvant analgesics (e.g., local anesthetics) also are used to manage acute pain.

In general, mild somatic pain responds well to oral nonopioids (e.g., acetaminophen, nonsteroidal anti-inflammatory drugs [NSAIDs]), topical agents (e.g., local anesthetics), and physical treatments (e.g., rest, ice, compression, elevation).[1] Moderate to moderately severe acute pain is more likely to require opioids.[17-18] Nonopioids often are combined with opioids to improve pain relief and diminish the risk of side effects. Various factors (e.g., preferred route of administration, time of onset, dosing frequency, side effect profile) influence the choice of individual agents in a drug class.

Excessive concern about addiction and regulatory scrutiny heavily contribute to the undertreatment of pain (see I.E.4,5). Analgesics, especially opioids, are underprescribed and underdosed for both acute and chronic pain. Moderate to severe acute pain should be treated with sufficient doses of opioids to safely relieve the pain. If drug side effects preclude achieving adequate pain relief, the side effects should be treated and/or another opioid should be tried. The concomitant use of other analgesics (e.g., nonopioids, local anesthetics) and nonpharmacologic methods (e.g., applied heat or cold, electroanalgesia, relaxation) maximizes pain relief and minimizes the risk of treatment-limiting side effects.

b. Nonpharmacologic approaches

Nonpharmacologic approaches to acute pain management should supplement, but not replace, analgesics.[1] However, the medical condition of some patients with acute pain (e.g., severe trauma or burns) may limit the use of nonpharmacologic therapy. Postoperative patients who receive preoperative instruction in simple psychological methods (Table 30) such as relaxation and imagery are especially likely to benefit. Thus, instruction in nonpharmacologic methods of pain management is an important part of the preoperative assessment (Table 12). Physical methods of pain management can be helpful in all phases of care, including immediately after tissue trauma (e.g., rest, application of cold, compression, elevation) and late during the healing period (e.g., exercises to regain strength and range of motion) (Table 31).

4. Management of Some Common Types of Acute Pain

Table 33 defines and presents examples of some common types of acute pain, including pain associated with an acute illness, perioperative pain, posttraumatic pain (major and minor), procedural pain, and obstetrical pain. Tables 34 to 36 summarize some pharmacologic and nonpharmacologic approaches to the management of these types of pain. The former category is divided into medications administered via systemic routes (Table 34) and those administered regionally (i.e., regional anesthesia)(Table 35). The reasons these pain types were selected for discussion include:

- Their relatively high prevalence
- The availability of effective pharmacologic and nonpharmacologic methods of management
- The availability of clinical practice guidelines

[a] Nikolajsen and colleagues[13] found that the rate and intensity of phantom and stump pain, as well as the consumption of opioids, did not differ significantly between 29 patients randomly assigned to receive epidural bupivacaine and morphine before, during, and for 1 week after the lower-limb amputation and 31 control-group patients who received epidural saline before and during the amputation then oral or intramuscular morphine. Lambert et al.[14] reported that a perioperative epidural block started 24 hours prior to amputation was not superior to the intra- and post-operative infusion of a local anesthetic via a perineural catheter in preventing phantom pain. However, the former did provide better relief of stump pain during the immediate postoperative period.

Table 33. Common Types of Acute Pain

Type or Source	Definition	Source or Examples
Acute illness	Pain associated with an acute illness	Appendicitis, renal colic, myocardial infarction
Perioperative (includes postoperative)[a]	Pain in a surgical patient because of preexisting disease, the surgical procedure (e.g., associated drains, chest or nasogastric tubes, complications), or both	• Head and neck surgery • Chest and chest wall surgery • Abdominal surgery • Orthopedic and vascular surgery (back, extremities)
Posttraumatic (major trauma)	Includes generalized or regionalized pain due to a major acute injury	Motor vehicle accident
Posttraumatic (minor trauma)	Pain due to a minor acute injury	Sprain, laceration
Burns	Pain due to thermal or chemical burns	Fire, chemical exposure
Procedural	Pain associated with a diagnostic or therapeutic medical procedure	Bone marrow biopsy, endoscopy, catheter placement, circumcision, chest tube placement, immunization, suturing
Obstetrical	Pain related to labor and delivery	Childbirth by vaginal delivery or Cesarean section

Sources: References 1 and 19.

[a]The American Society of Anesthesiologists defines acute pain in the perioperative setting as "pain that is present in a surgical patient because of preexisting disease, the surgical procedure (e.g., associated drains, chest or nasogastric tubes, complications), or a combination of disease-related and procedure-related sources."[19] Thus, perioperative pain includes postoperative pain (i.e., pain that follows surgery).

(CPGs) outlining appropriate care
- Evidence of undertreatment and/or nonadherence to relevant CPGs.

These tables merely provide an overview of treatments. They do not consider all of the risks associated with treatments or the needs of special populations. The reader should refer to the appropriate CPGs to make specific management decisions.

B. Chronic Noncancer Pain

This section reviews general approaches to the treatment of chronic noncancer pain (CNCP), including treatment goals, therapeutic approaches, and elements of treatment. It also provides general information about the treatment of some common types of CNCP (i.e., summary tables) and identifies relevant clinical practice guidelines (CPGs).

1. Treatment Goals

As discussed in Section I.C.4, CNCP is a debilitating condition that often is associated with significant physical, emotional, and social disability. A complex interaction among these factors contributes to the persistence of pain. Therefore, treatment should address important social and psychological consequences of the pain as well as any physical pathology. Usually this entails a comprehensive approach that includes medication and functional rehabilitation.[28]

Functional rehabilitation helps the patient develop skills to manage the pain. It includes patient education, regular assessment, management of contributing illnesses (e.g., depression), and the setting of attainable treatment goals.[28] The latter should take into account factors such as the patient's acceptance of his or her condition, the patient's motivation to participate in treatment, the patient's ability to follow through with recommendations, and the available time and resources.[29] General treatment goals for CNCP include:[2,28-30]

- Diminish suffering, including pain and associated emotional distress
- Increase/restore physical, social, vocational, and recreational function
- Optimize health, including psychological well-being
- Improve coping ability (e.g., develop self-help strategies, reduce dependence on health care system) and relationships with others (e.g., family, friends, health care professionals).

Table 34. Systemic Medications for Acute Pain Management

Pain Type or Source	Nonopioids	Opioids	Adjuvant Analgesics	Other	Comments
Acute illness	Acetaminophen, NSAIDs	Systemic opioids			
Perioperative pain[a]	Acetaminophen, NSAIDs[b]	Systemic opioids[c], including PCA[d]	Local anesthetics (e.g., idocaine, bupivacaine[e])		Use multimodal therapy when possible Recognize needs of special populations Scheduled ATC dosing generally preferred to PRN
Major trauma (generalized pain)	Acetaminophen, NSAIDs during post-trauma healing phase	Bolus or continuous IV opioids[f] during emergency phase; PO or IV opioids during healing phase	IV ketamine (very rare)	Inhaled NO	Use of ketamine is restricted to pain refractory to other treatments due to severe CNS side effects Inhaled NO is used for incident pain
Major trauma (regionalized pain)	NSAIDs (parenteral, oral) during post-trauma healing phase	Bolus or continuous IV opioids during emergency phase plus regional anesthesia	IV ketamine (very rare)	Inhaled NO	Use of ketamine is restricted to pain refractory to other treatments due to severe CNS side effects Inhaled NO is used for incident pain
Burns	Acetaminophen, NSAIDs during rehabilitative phase (i.e., no early role)	High doses of IV opioids (e.g., morphine, fentanyl) ± PCA for NPO patients; oral opioids (e.g., morphine, hydromorphone) when taking PO	Parenteral ketamine (very rare) IV lidocaine (very rare)	BNZ Inhaled NO	Use of ketamine is restricted to pain refractory to other treatments due to severe CNS side effects Inhaled NO is used for incident pain Infusion of low-dose lidocaine is restricted to burn pain refractory to opioids Lorazepam or midazolam for background and procedural anxiolysis
Minor trauma	Acetaminophen, NSAIDs	Opioids for mild-to-moderate pain			
Procedural pain	NSAIDs for preemptive analgesia and post-procedural pain	IV opioids (e.g., morphine, hydromorphone, fentanyl) unless contraindicated[g]	Local anesthetics (e.g., EMLA®, lidocaine, bupivacaine, ropivacaine) IV ketamine	BNZ (e.g., diazepam, lorazepam, midazolam) Inhaled NO Propofol[h]	Local anesthetics may be applied topically (e.g., EMLA®), injected into tissue, or used for nerve blocks Use of ketamine limited by severe CNS side effects
Obstetrical pain		Bolus IV opioids (e.g., fentanyl, hydromorphone, morphine)			

Sources: References 1 and 17-24.

[a]The American Society of Anesthesiologists defines acute pain in the perioperative setting as pain that is present in a surgical patient because of preexisting disease, the surgical procedure (e.g., associated drains, chest or nasogastric tubes, complications), or a combination of disease-related and procedure-related sources.[19] Thus, perioperative pain includes postoperative pain (i.e., pain that follows surgery).

[b]Unless contraindicated, NSAIDs (and acetaminophen) are recommended for mild-to-moderate postoperative pain, and parenteral ketorolac may be used for moderate-to-severe pain.[1] Continue nonopioids even after adding opioids for opioid-sparing effects.[1]

[c]Moderately severe to severe postoperative pain should initially be treated with an opioid analgesic with or without an NSAID.[1] Morphine is the standard agent for opioid therapy; if contraindicated, hydromorphone may be substituted.[1]

[d]Preferred route of administration is IV (bolus or continuous PCA). Rectal and subcutaneous are alternative routes of administration. Switch to oral administration when the patient can take medication by mouth.

[e]Local anesthetics may be combined with opioids for intraspinal analgesia or used for regional nerve blocks.

[f]Titrate opioids carefully to maintain stable cardiovascular and respiratory status. Monitor neurological and neurovascular status continuously in patients with head injury or limb injury, respectively.[1]

[g]Contraindications to opioid analgesia include altered sensorium, full-term pregnancy, lung disease, or inability to monitor and manage certain side effects (e.g., respiratory depression).[1]

[h]Hypnotic general anesthetic that produces good sedation.

ATC: around-the-clock; BNZ: benzodiazepines; CNS: central nervous system; EMLA®: Eutectic Mixture of Local Anesthetics (lidocaine and prilocaine); IV: intravenous; LAs: local anesthetics; NO: nitrous oxide; NPO: nothing per os (by mouth); NSAIDs: nonsteroidal anti-inflammatory drugs, including aspirin: PO: per os (oral); PCA: patient-controlled analgesia; PRN: as needed; TD: transdermal.

Table 35. Regional Anesthesia for Acute Pain Management

Perioperative pain[a]	• Epidural anesthesia with opioids or opioid plus local anesthesia mixture injected intermittently or infused continuously[b] • Intrathecal opioids or opioid plus local anesthetics • Local neural blockade[c] • Other regional anesthesia[d] techniques
Trauma	• Limited to local neural blockade[c] during emergency phase • Also includes epidural analgesia with opioids and/or local anesthetics during post-trauma healing phase, especially for regionalized pain[e]
Burns	• Epidural analgesia with opioids and/or local anesthetics (only after closure of burn wound)
Procedural	• Includes local infiltration with local anesthetics
Obstetrical pain[f]	• Epidural analgesia[g] or spinal analgesia with local anesthetics (e.g., bupivacaine, ropivacaine) and/or opioid • Combined spinal-epidural techniques (combined spinal-epidural techniques)[h] with opioids • Epidural analgesia, spinal, or combined spinal-epidural techniques for Cesarean section • Tissue infiltration with local anesthetics

Sources: References 1, 19-20, and 22-24.
[a]The American Society of Anesthesiologists defines acute pain in the perioperative setting as "pain that is present in a surgical patient because of preexisting disease, the surgical procedure (e.g., associated drains, chest or nasogastric tubes, complications), or a combination of disease-related and procedure-related sources."[19] Thus, perioperative pain includes postoperative pain (i.e., pain that follows surgery).
[b]Good analgesia but risk of delayed-onset respiratory depression; requires careful monitoring for potential complications (e.g., abscess development, anesthesia of a nerve root at the site of catheter tip).[1] Addition of a local anesthetic has opioid-sparing effect and improves analgesia.
[c]Local neural blockade is by intermittent (e.g., intercostal nerve blockade with local anesthetics or cryoprobe) or continuous (infusion of local anesthetic through an interpleural catheter) methods.
[d]Other regional anesthesia techniques include: infiltration of incisions with local anesthetic.
[e]Useful when not contraindicated by sepsis, coagulopathy, or cardiorespiratory instability.[1] Must clear spine before using central conduction block or intraspinal opioids.[23]
[f]Goal of regional anesthesia in pregnant women is to provide adequate analgesia with as little block as possible.[20]
[g]Epidural anesthesia is preferred to spinal analgesia and parenteral opioids due to superior analgesia and decreased risk of maternal and/or fetal complications.[20] Epidural analgesia with opioids with a local anesthetic provides better analgesia than epidural anesthesia with local anesthetics alone but is associated with greater risk of complications.[20]
[h]Combined spinal-epidural techniques may provide rapid and effective analgesia for labor, but there is a higher risk of side effects.[20]

Table 36. Nonpharmacologic Interventions for Acute Pain

Pain Type or Source	Physical Methods[a]	Psychological Methods	Other
Acute illness	• Vibration or cold for some HA; immobilization	Patient education, relaxation, imagery, distraction	
Perioperative pain[b]	• Exercise or immobilization • Massage • Application of heat or cold • Electroanalgesia (e.g., TENS)	Patient education, relaxation, distraction, imagery, biofeedback, hypnosis	Acupuncture
Trauma	• Rest, ice, compression, elevation (RICE) • Physical therapy (e.g., stretching, strengthening, thermal therapy, TENS, vibration)	Relaxation, hypnosis, distraction, supportive psychotherapy, coping skills training	
Burns	• Limb elevation • Minimize number of dressing changes	Patient education, distraction, deep relaxation, imagery, hypnosis, operant conditioning	
Procedural	• Application of cold (pre- and post-procedure) • Counterirritation methods (e.g., simple massage, scratching, pressure) • Rest or immobilization (post-procedure)	Patient education, relaxation, distraction, imagery, music relaxation	
Obstetric		Patient education, relaxation breathing, distraction	

Sources: References 1, 18-19, and 21-27.
[a]Physical agents or modalities provide pain relief, improve physical function, and reduce fears associated with pain-related immobility or activity restriction.[1]
[b]The American Society of Anesthesiologists defines acute pain in the perioperative setting as "pain that is present in a surgical patient because of preexisting disease, the surgical procedure (e.g., associated drains, chest or nasogastric tubes, complications), or a combination of disease-related and procedure-related sources."[19] Thus, perioperative pain includes postoperative pain (i.e., pain that follows surgery).
HA: headache; TENS: transcutaneous electrical nerve stimulation.

2. Therapeutic Strategies

a. Multimodal therapy

As with acute pain, the literature and various CPGs support the use of multimodal therapy for chronic pain. In their 1997 Practice Guidelines for Chronic Pain Management, the American Society of Anesthesiologists (ASA) defines multimodal therapy as the "concomitant use of separate therapeutic interventions under the direction of a single practitioner to obtain additive beneficial effects or reduction of adverse effects."[2]

Examples of multimodal therapy include use of:

- Medications from different classes (i.e., combination drug therapy)
- Rehabilitative therapies (e.g., physical therapy, occupational therapy) and medications
- Regional anesthesia (e.g., neural blockade) and medications.

b. Interdisciplinary approach to rehabilitation

The literature[31-32] and various organizations (e.g., the Commission on Accreditation of Rehabilitation Facilities [CARF], the American Academy of Family Physicians [AAFP]) also support the use of an interdisciplinary rehabilitative approach to the management of chronic pain. This refers to a process in which health care professionals with disparate training collaborate to diagnose and treat patients suffering from difficult pain states. The Rehabilitation Accreditation Commission (also known as CARF) defines a chronic pain management program (CPMP) as [one that] "provides coordinated, goal-oriented, interdisciplinary team services to reduce pain, improve functioning, and decrease the dependence on the health care system of persons with chronic pain syndrome."[33-34] Various reviews of program outcomes suggest that potential benefits of participation in a CPMP include reduced pain intensity, improved sense of control over the pain, physical reconditioning, lower use of opioids and health care resources, reduced health care costs, and increased employment.[2,30-32,35-36]

Essential functions of a CPMP include medical diagnosis, assessment of physical function, psychosocial assessment, pharmacologic therapy, physical rehabilitation, patient education, and appropriate psychological approaches (e.g., relaxation, biofeedback, coping skills training, psychotherapy).[30,36] In some patients, more invasive approaches (e.g., nerve blocks, trigger point or steroid injections, epidural or intrathecal analgesia, neurosurgical procedures) and/or intensive chronic pain rehabilitation are warranted. Team members represent a number of health care disciplines and include physicians (e.g., neurologists, psychiatrists, anesthesiologists, rheumatologists, neurosurgeons, physiatrists), nurses, pharmacists, case managers, social workers, physical therapists, occupational therapists, and vocational counselors.[37] Interventions are diverse, as summarized in Table 37.

Table 37. Interdisciplinary Management of CNCP: Examples of Interventions

- Patient education: counseling about the pain, aggravating and alleviating factors, management strategies, lifestyle factors that may influence the pain (e.g., use of nicotine, alcohol.
- Physical rehabilitative approaches: physical therapy modalities for reconditioning (e.g., walking, stretching, exercises to improve strength and endurance, oscillatory movements)
- Other physical approaches: application of heat or cold, TENS, massage, acupuncture
- Occupational therapy: attention to proper body mechanics, resumption of normal levels of activities of daily living
- Pharmaceuticals: nonopioids, opioids, antidepressants, antiepileptic drugs, stimulants, antihistamines
- Regional anesthesia: nerve blocks (e.g., diagnostic, somatic, sympathetic, visceral, trigger point) and/or intraspinal analgesia (e.g., opioids, clonidine, baclofen, local anesthetics)
- Psychological approaches: relaxation training, hypnosis, biofeedback, copings skills, behavior modification, psychotherapy
- Surgery: neuroablation, neurolysis, microvascular decompression

Sources: References 2, 28, 30, and 36-37.

CNCP: chronic noncancer pain; TENS: transcutaneous electrical nerve stimulation.

3. Elements of Treatment

a. Pharmacologic management

Although similarities exist, the pharmacologic management of CNCP differs from that for acute pain in some important ways.

Greater use of adjuvant analgesics: The greater use of adjuvant analgesics for chronic pain reflects, in part, the greater frequency of neuropathic pain and reduced responsiveness of such pain to traditional analgesics. The results of multiple placebo-controlled clinical trials and various CPGs[2,28] support the use of antidepres-

sants, antiepileptic drugs, and local anesthetics as first-line approaches to the treatment of chronic pain. The 1997 ASA CPGs for Chronic Pain Management state that membrane stabilizing agents, antidepressants, and NSAIDs "provide analgesic and health benefits" in patients with chronic pain.[2] The 2000 AAFP CPGs for the treatment of CNCP note that secondary benefits of antidepressants include improved sleep and the treatment of any associated depression or anxiety.[28] Similarly, the antiepileptic drug gabapentin improves sleep and mood, as well as pain and quality of life, in patients with some types of neuropathic pain.[38-39]

More judicious use of opioids: For many years, use of opioids to treat CNCP was considered ill-advised. This position reflected multiple fears and concerns, including the potential for iatrogenic addition, declining efficacy, toxicities, and potential interference with optimal functioning (e.g., promotion of regression, reinforcement of pain behaviors, diversions, decreased motor and cognitive functioning).[40] However, a number of pain-related organizations and experts have expressed recent support for the judicious use of opioids in patients with chronic pain. For example, the American Academy of Pain Medicine and the American Pain Society recently issued a statement that supports the use of opioids in select patients with CNCP.[41] As with other medical interventions, such a decision must be based on careful consideration of the ratio of benefits to risks (e.g., toxicity, functional impairment, addiction).[b,40] Table 38 summarizes some recommendations regarding use of opioids in patients with CNCP.[48]

b. *Nonpharmacologic approaches*

Nonpharmacologic approaches play a key role in managing CNCP. Patient education is potentially the most critical therapy, as it is often essential for rehabilitation. Invalidism and family enabling may result from uncertainty or inaccurate information.[30] Reconditioning reduces pain, promotes physical and psychological rehabilitation, and empowers the patient. In addition to reducing emotional distress, psychological techniques (e.g., relaxation, biofeedback) can relax muscles and reduce autonomic nervous arousal. In its 2000 CPGs, the AAFP recommends the use of nonpharmacologic interventions (i.e., patient education, physical therapy [PT], occupational therapy [OT], treatment of coexisting psychological disorders) in the management of all patients with CNCP.[28]

Table 38. Recommendations for Opioid Therapy in Patients with Chronic Noncancer Pain

Before treatment:

- Perform comprehensive assessment, including a pain history and assessment of the impact of the pain, a directed physical examination, a review of prior diagnostic study results or interventions, a drug history (i.e., past abuse), and an assessment of coexisting diseases or conditions.
- Consider obtaining a second opinion from a physician or psychologist with expertise in pain management and use of interdisciplinary team.
- Optimize nonpharmacologic and nonopioid therapies.
- Inform patient of potential risks of use of controlled substances, including addiction (informed consent)
- Agree on issues including how drugs will be provided, acceptable number of rescue doses, pharmacy to be used for prescription refills, and the follow-up interval.

During treatment:

- Administer opioids primarily via oral or transdermal routes, using long-acting medications when possible
- Use a fixed dosed ("around-the-clock") regimen.
- Perform careful drug titration, balancing analgesia against side effects.
- Continue efforts to improve analgesia via complementary approaches (e.g., behavioral approaches, formal rehabilitation program, other medications).
- Consider use of hospitalization for pain that is not treated by transient, small dose increments.
- Monitor for evidence of drug hoarding, unauthorized dose increases, and other aberrant behavior. Reconsider therapy in the occurrence of such behaviors.
- Perform frequent follow-up evaluation to monitor analgesia, side effects, functional status, quality of life, and any evidence of medication misuse.
- Consider use of self-report instruments (e.g., pain diary).
- Carefully document the overall pain management treatment plan and include the reason for opioid prescribing, any consultations received, and results of periodic review of the patient's status.

Sources: References 29, 41, and 48.

4. Management of Some Common Types of Chronic Noncancer Pain

There are many types of CNCP. This section provides a brief overview through the summary tables of a few common types. In addition to their relatively high prevalence, these pain types were selected because effective treatments and/or evidence of inadequate management

[b] Some studies have shown beneficial effects of long-term opioid therapy in carefully selected patients with CNCP, including reduced pain, improved performance, and enhanced quality of life.[42-44] However, clinicians should remain aware of the potential for opioid-induced hyperalgesia and/or analgesia without associated improvement in function in some patients.[40,43,45-47]

exist. Tables 39 to 42 summarize management approaches, including systemic administration of medications (Tables 39 and 40), interventional techniques (Table 41), and nonpharmacologic strategies (Table 42), for the following types of CNCP:

Arthritis pain

Arthritis pain can result from more than 100 rheumatic diseases, which cause pain, stiffness, and swelling of joints as well as damage to supporting structures.[55] Osteoarthritis (OA) and rheumatoid arthritis (RA) are the most common types of arthritis. OA (often referred to as degenerative joint disease) is characterized by a progressive loss of articular (joint) cartilage, mostly affecting weight-bearing and frequently used joints (e.g., hip, knee).[53] It often manifests as deep aching pain, stiffness, and limited range of motion. RA is a common inflammatory arthritis of unknown etiology that affects multiple joints.[53] RA manifests clinically as aching,

Table 39. Pharmacologic Management for Chronic Noncancer Pain: Selected Examples

Type of Pain	Nonopioids	Opioids	Adjuvant Analgesics and Disease-Specific Drugs	Comments
Arthritis pain	Acetaminophen NSAIDs Selective COX-2 inhibitors[a]	Short-term, mild opioids for flare-ups	Corticosteroids (oral for RA, injections for OA and RA) Topical capsaicin DMARDs[b] (e.g., MTX, DP, gold salts, AZA, SSZ, HCQ) BRM[c] (e.g., entanercept, inflixmab)	Select NSAID based on dosing, efficacy, tolerance, costs, and patient preference Monitor closely for NSAID side effects Opioids are appropriate for long-term treatment in selected patients
Low back pain	Acetaminophen NSAIDs Selective COX-2 inhibitors	Short-term opioids for mild-to-moderate flare-ups	TCAs (e.g., amitriptyline, nortriptyline) AEDs Muscle relaxants (short term)	Opioids are appropriate for long-term treatment in selected patients
Fibromyalgia	Acetaminophen NSAIDs Selective COX-2 inhibitors	Opioids (occasional use for "flares") Tramadol	TCAs (e.g., amitriptyline, nortriptyline, doxepin) Muscle relaxants (short- term) (e.g., cyclobenzaprine)	Tramadol may have less potential for abuse
Sickle cell disease pain	Acetaminophen, NSAIDs	Short-acting[d] or long-acting opioids	Sedatives Anxiolytics	Use short-acting opioids for short-term treatment and longer-acting opioids for longer treatment
Peripheral neuropathy (e.g., PDN, PHN)	Acetaminophen NSAIDs	Opioids (short-term only)	TCAs (e.g., amitriptyline) AEDs (e.g., gabapentin, carbamazepine, valproate) Topical agents (e.g., lidocaine patch, capsaicin) Local anesthetics (e.g., lidocaine, mexiletine)[e] (rarely used) NMDA antagonists (e.g., ketamine[f]) (rarely used)	AEDs, TCAs, and topical local anesthetics are first-line treatments Lidoderm® is first FDA-approved treatment for PHN Placebo-controlled trials found TCAs and gabapentin equally effective for treatment of PDN and PHN NSAIDs are rarely effective Try opioids as last resort

Sources: References 17, 38-39, and 49-70.

[a]Initial recommended treatment for OA includes acetaminophen and nonpharmacologic management (e.g., education, exercises, joint protection).[49-51] Patients who need additional pain relief and symptom control should receive low- or full-dose NSAIDs, topical capsaicin, or corticosteroids, as indicated. The initial drug treatment of RA usually involves NSAIDs.[52] Patients with inadequate response to NSAIDs may require DMARDs.[52]

[b]DMARDs are associated with multiple toxicities; therefore, they require careful balancing of the risks and benefits and close patient monitoring.[52]

[c]Biological response modifiers are used to reduce symptoms in some patients with RA.[53]

[d]Morphine or hydromorphone is preferred to meperidine due to potential toxicity of the meperidine metabolite.[54]

[e]These medications are contraindicated in patients with cardiac conduction abnormalities, left ventricular dysfunction, or severe liver or renal disease. Topical lidocaine (Lidoderm®) is not associated with the toxicities seen with systemic administration of lidocaine.

[f]NMDA antagonists are effective but are used very rarely due to severe central nervous system side effects.

AEDs: antiepileptic drugs; AZA: azathioprine; BRM: biological response modifiers; COX-2 inhibitors: cyclooxygenase-2 inhibitors; DMARDs: disease-modifying anti-rheumatic drugs; DP: D-penicillamine; FDA: Food and Drug Administration; HCQ: hydroxychloroquine; MTX: methotrexate; NMDA: N-methyl-D-aspartate; NSAIDs: nonsteroidal anti-inflammatory drugs; OA: osteoarthritis; PDN: painful diabetic neuropathy; PHN: postherpetic neuralgia; RA: rheumatoid arthritis; SSZ: sulfasalazine; TCAs: tricyclic antidepressants.

burning joint pain (often with swelling and redness), joint enlargement, joint and muscle stiffness, and various constitutional symptoms (e.g., fatigue, weakness, fever, weight loss). OA affects about 16 million, mostly older, Americans, whereas approximately 2.1 million Americans suffer from RA.[55] Approaches to management of arthritis pain include medications (e.g., disease-modifying anti-rheumatic drugs, nonsteriodal anti-inflammatory drugs, acetaminophen), physical rehabilitative approaches (e.g., exercises, OT, PT, massage, heat and cold, electroanalgesia), psychological approaches, and in some cases, acupuncture or surgery (Tables 39, 41, and 42).[49-52,55, 90]

b. Chronic low back pain

Chronic low back pain (LBP) is the commonest cause of disability in industrialized nations. About four out of five Americans will experience back pain at some point in their lives.[86] Whereas (acute) back pain resolves within 4-6 weeks in 90% of patients,[59-60] the pain persists in others. LBP has many causes (e.g., trauma, musculoskeletal spasm, arthritis, herniated disc with nerve compression, myofascial pain, ankylosing spondylitis, spinal stenosis, arachnoiditis, cancer, kidney disease, obesity) but, in most cases, no specific cause can be identified.[59-60] Management options for chronic LBP include medications, psychological approaches (education, "back school," psychotherapy, biofeedback), exercises, other physical approaches (e.g., OT, PT, electroanalgesia, heat and cold) and, in some cases, acupuncture, manipulation, or surgery (Tables 39, 41, and 42).[28,58,60-61]

c. Fibromyalgia

Fibromyalgia is a chronic syndrome that manifests as widespread musculoskeletal pain and multiple "tender points" localized to areas in the neck, spine, shoulders, and hips.[64] In addition to chronic pain with acute flares, patients often experience sleep disturbances, morning stiffness, anxiety, and irritability.[63-64] Fibromyalgia is diagnosed based on criteria established by the

Table 40. Pharmacologic Management of Migraine and Other Types of Headache

Headache Type	Prophylaxis	Abortive	Comments
Migraine	AEDs (e.g., divalproex sodium[a], gabapentin) BBs (e.g., propranolol, timolol)[a] CCBs (e.g., verapamil, nimodipine) TCAs (e.g., amitriptyline) NSAIDs (e.g., ASA, flurbiprofen) Estradiol[b] Methysergide[c]	NSAIDs (e.g., ASA, ibuprofen, naproxen, diclofenac, flurbiprofen, piroxicam) Opioids, including butorphanol[d] Combination treatment: • Acetaminophen plus ASA plus caffeine • ASA plus butalbital plus caffeine[e] • Acetaminophen plus codeine Dihydroergotamine[f]: (intranasal, SC, IV) Selective $5HT_{1B/1D}$ receptor agonists ("tripans") • Rizatriptan (PO) • Zolmitriptan (PO) • Sumatriptan (PO, SC, or intranasal) • Almotriptan (PO) • Eletriptan (PO) • Frovatriptan (PO) • Naratriptan (PO)	Acetaminophen plus ASA plus caffeine considered first-line treatment First-choice NSAIDs are ASA, ibuprofen, and naproxen; others also are effective Triptans are effective and appropriate initial choice for patient with mild to severe HA and no contraindications
Tension	TCAs (e.g., amitriptyline, doxepin)	Acetaminophen NSAIDs	
Cluster	CCBs (e.g., verapamil) Corticosteroids Methysergide AEDs (e.g., divalproex sodium)	Ergotamine Dihydroergotamine Inhalation of oxygen	

Sources: References 71-80.

[a]Divalproex sodium, timolol, and propranolol are indicated for migraine prophylaxis.

[b]Estradiol administered premenstrually can prevent migraine in women who have migraine related to menses.[71-74]

[c]Methysergide is effective but of limited utility due to the risk of complications (e.g., retroperitoneal or retropleural fibrosis).[71-74]

[d]Intranasal butorphanol is effective for migraine[71-74] and is good rescue therapy.[75] IV opioids also may be appropriate for rescue therapy.[71-74]

[e]This combination requires careful monitoring due to the potential for abuse of butalbital.[71-74]

[f]Consider dihydroergotamine for headaches that have not responded to other first-line treatments or patients who cannot take PO.

5-HT: 5-hydroxytryptamine; AEDs: antiepileptic drugs; ASA: aspirin; BBs: beta blockers; CCBs: calcium channel blockers; HA: headache; IV: intravenous; NSAIDs: nonsteroidal anti-inflammatory drugs; PO: per os (oral); SC: subcutaneous; TCAs: tricyclic antidepressants.

Table 41. Regional Anesthesia for Chronic Noncancer Pain

Pain Type	Method
Arthritis pain	Intra-articular injection[a] of corticosteroids (e.g., methylprednisolone) Intra-articular injections of sodium hyaluronate[b]
Low back pain	Facet joint injections with local anesthetic[c] Sciatic nerve block with local anesthetic for backache due to sciatica Epidural steroid injections (e.g., methylprednisolone), often with local anesthetic (e.g., lidocaine)[d]
Headache and migraine	Occipital nerve block with local anesthetic for occipital headache

Sources: References 51 and 83-84.

[a]Corticosteroid injections are used for the knees and hips and are limited to 3-4 per year.[51]

[b]These injections are approved for the knee, and studies have shown mixed results in regard to efficacy.[81-82]

[c]Controversy exists over the efficacy of therapeutic facet blocks but they are useful diagnostic blocks.[83]

[d]Controversy exists over the efficacy of epidural steroids for low back pain. Frequent epidural steroids can suppress hypothalamic-pituitary-adrenal axis function. Also, there is the potential for complications due to the epidural approach (e.g., hematoma, infection), the steroids (e.g., hypertension, hyperglycemia), or local anesthetic (heart arrhythmias).[84]

American College of Rheumatology.[64] Its cause is unknown, but theories about its etiology include trauma and infection.[63] About 3 to 6 million Americans suffer from fibromyalgia, mostly women of child-bearing age.[64] Fibromyalgia generally is managed with medications, psychological approaches (education, relaxation therapy, hypnosis, psychotherapy), aerobic exercise, other physical approaches (e.g., OT, PT, electroanalgesia, heat and cold, vibration), and in some cases, acupuncture or manipulation (Tables 39 and 42).[56,63,91]

d. Sickle cell disease pain

Sickle cell disease (SCD) refers to a group of inherited blood disorders in which an abnormal form of hemoglobin, hemoglobin S, is the predominant form of hemoglobin. Chronic hemolytic anemia and vaso-occlusive events are its major pathologic features, and the primary clinical manifestation of SCD is pain.[54] Deoxygenated hemoglobin S causes red blood cells to sickle (change shape) at sites of low oxygen availability, stick to the lining of small blood vessels, and occlude (plug) them. Along with inflammation, these vaso-occlusive events cause pain. Other causes of pain in these patients include infection, infarction, and the accumulation of blood in various organs. According to the 1999 American Pain Society *Guideline for the Management of Acute and Chronic Pain in Sickle Cell Disease*, SCD pain may be acute, chronic, or of mixed duration and attributable to the disease or its treatment.[54] Sickle cell pain is managed with medications, physical approaches (e.g., adequate hydration, applied heat, PT, massage, ultrasound, electroanalgesia) and psychological approaches (e.g., deep breathing, relaxation, biofeedback) appropriate for acute and chronic pain management (Tables 39 and 42).[54,66] SCD is also managed with a various treatments (e.g., transfusions) that reduce sickling.

e. Peripheral neuropathy

Peripheral neuropathy (PN) is a disorder caused by damage to one or more peripheral nerve(s). Its incidence is unknown, but it is a common feature of many systemic diseases.[89] Diabetes and alcohol are the most common causes of PN in developed countries.[89] Other causes include other endocrine disorders and nutritional deficiencies, infection (e.g., post herpetic neuralgia, human immunodeficiency virus-related neuropathy), hereditary conditions, trauma, nerve entrapment (e.g., carpal tunnel syndrome), collagen-vascular disorders, toxic agents, and cancer.[68] Yet, in many cases, the cause of the neuropathy is unknown.[67,89] Clinically, PN often manifests as weakness, numbness, paresthesias (abnormal sensations, such as pins and needles, burning, tingling, or prickling), and pain in the hands, arms, legs, or feet.[67] Treatment of the PN depends on the underlying cause and includes medications, physical approaches (e.g., PT, electroanalgesia, cold and heat), psychological approaches (including education about management of the underlying condition), and in some cases, surgery (Tables 39 and 42).[67-68]

f. Headache

Headache includes migraine with and without aura, tension-type, and cluster headaches. Headache disorders may be acute, chronic, or both, but are classified as chronic for the purpose of this discussion. Symptoms, triggers, and treatment vary with headache type. Migraine without aura (formerly common migraine) is an idiopathic chronic headache disorder characterized by a unilateral, pulsating headache of moderate to severe intensity. The headache ranges in

Table 42. Nonpharmacologic Interventions for Chronic Noncancer Pain

Type of Pain	Surgical	Other Physical Methods	Psychological Methods	Other
Arthritis pain	Includes arthroscopy and TJR for OA[a] and synovectomy, osteotomy, spinal fusion, and arthroscopy and TJR for RA	TENS, applied heat or cold, low-impact aerobic and ROM exercises, joint protection (splint or brace), massage, PT, OT	PE (rest, exercise, nutrition) and social support	Acupuncture Nutritional supplements[b]
Low back pain	For example, laminectomy, diskectomy, lumbar fusion, lumbar stabilization[c]	SCS, cryoanalgesia, radiofrequency coagulation, exercise (for strength and flexibility), PT, OT, TENS, braces, vibration	PE, "back school," biofeedback, psychotherapy	Acupuncture Manipulation therapy
Fibromyalgia		Applied heat, massage, gentle aerobic exercise and stretching, attention to proper posture, PT, TENS, vibration	PE, relaxation, hypnosis, psychotherapy	Acupuncture[d]
Sickle cell disease		Careful hydration, applied heat, massage, ultrasound, PT, TENS	PE, deep breathing and relaxation techniques, distraction, imagery, hypnosis, meditation, biofeedback, psychotherapy	Acupuncture/ acupressure
Peripheral neuropathy (e.g., PDN, PHN)	For example, decompressive surgery for nerve entrapment, vascular surgery for vascular insufficiency	Good skin care and foot care, PT, TENS, possibly SCS, applied heat or cold, massage	PE (e.g., need for tight blood glucose control, good skin and foot care), relaxation, biofeedback, psychotherapy	
Migraine and other types of headache		Application of heat or cold, exercise (prophylaxis), vibration	PE (triggers, medication compliance), relaxation and biofeedback (thermal, EMG training) for headache prophylaxis	

Sources: References 49-52, 54-56, 58, 60, 65, 67-68, 86, and 88-89.

[a]Surgery for OA is for patients with moderate to severe pain and functional disability who have not responded to medical therapy.[5] Total joint arthroplasty usually is associated with a good outcome and improved quality of life.[85]

[b]Not currently recommended due to lack of data. Trials for some supplements (glucosamine and chrondroitin sulfate) are underway.[51]

[c]The Food and Drug Administration has approved medical devices such as the Intervertebral Body Fusion device, Anterior Spinal Implant, and Posterior Spinal Implant to treat degenerative disk disease and stabilize and fuse the spine.[86]

[d]Usually reserved for patients with fibromyalgia syndrome/myofascial pain syndrome who do not respond to other measures.[56,87]

EMG: electromyography; OA: osteoarthritis; OT: occupational therapy; PDN: painful diabetic neuropathy; PE: patient education; PHN: postherpetic neuralgia; PT: physical therapy; RA: rheumatoid arthritis; ROM: range of motion; SCS: spinal cord stimulation; TENS: transcutaneous electrical nerve stimulation; TJR: total joint replacement.

duration from 4 to 72 hours and is accompanied by various symptoms (e.g., photophobia, nausea, vomiting).[79] Migraine with aura (formerly classic migraine) is similar but is preceded by transient neurologic symptoms (e.g., visual disturbances, aphasia, hemiparesis). Tension-type headache refers to a bilateral pressing or tightening type of headache of mild to moderate severity, which may be episodic or chronic.[79] Cluster headaches are unilateral headaches usually located around the eye (periorbital). Patients may experience excruciating boring, knife-like, or burning pain, tearing, and rhinorrhea. The attacks are relatively short but may recur numerous times a day.[79] Treatment of migraine includes medications (abortive and prophylactic), physical approaches (e.g., cold and heat), psychological approaches (e.g., relaxation, biofeedback), and in some cases, regional anesthesia (Tables 40 to 42).[71-78]