

26

Acute and Postoperative Pain

- I. Be aware of the epidemiology and magnitude of the problem of inadequate pain control after operations, medical procedures and conditions, or trauma (including burns) (Cousins and Power 1999; Svensson et al. 2000; NHMRC 2005). Know the numbers and prevalence rates of moderate to severe pain in each of these contexts: the burden upon subpopulations such as infants and children, older patients, pregnant or breast-feeding patients, ethnic minorities, and patients with psychiatric illness or those unable to communicate (NHMRC 2005).
 - A. Managing pain in the older patient. Know that:
 1. Experimental pain thresholds to a variety of noxious stimuli are increased in older people.
 2. Patient-controlled analgesia (PCA) and epidural analgesia are more effective in older people than conventional opioid regimens.
 3. Reported frequency and intensity of acute pain in clinical situations may be reduced in the older person.
 4. 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 scale may be more reliable than others.
 5. There is an age-related decrease in opioid requirements, but significant interpatient variability persists.
 6. The use of nonsteroidal anti-inflammatory drugs (NSAIDs) and COX-2 inhibitors in older people requires extreme caution; acetaminophen (paracetamol) is the preferred non-opioid analgesic.
 7. The assessment of pain and evaluation of pain relief therapies in the older patient may present problems arising from differences in reporting, cognitive impairment, and difficulties in measurement.
 8. Measures of present pain may be more reliable than those of past pain, especially in patients with some cognitive impairment.
 9. The physiological changes associated with aging 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.
 - B. Ethnic groups and non-English-speaking patients. Understand that:
 1. Multilingual printed information and pain measurement scales are useful in managing patients from different cultural or ethnic backgrounds.
 2. With appropriate instruction, PCA may help overcome some of the barriers to postoperative analgesia provision in a multicultural environment.
 3. Ethnic and cultural background can affect significantly the ability to assess and treat acute pain.
 - C. Managing acute pain during pregnancy (see Chapter 36). Know that:
 1. Use of NSAIDs during pregnancy does not seem to increase the risk of adverse birth outcome, but is associated with increased risk of miscarriage.
 2. Use of opioids in pregnancy does not cause fetal malformations, but results in neonatal abstinence syndrome.
 3. Meralgia paresthetica is a nerve entrapment syndrome with significantly increased incidence in pregnancy.

4. For pain management in pregnancy, nonpharmacological treatment options should be considered where possible before analgesic medications are used.
5. 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.

D. Managing pain in the puerperium. Know that:

1. Routine episiotomy does not reduce perineal pain; perineal wounds due to birth trauma should be sutured using continuous subcuticular absorbable sutures.
2. Acetaminophen and rectal NSAIDs are effective in perineal pain after childbirth.
3. The application of cooling, in particular cooling gel pads, and the use of warm baths is effective in treatment of perineal pain after childbirth.
4. Codeine should be avoided in treatment of perineal pain after childbirth.
5. Bromocriptine should be avoided for the treatment of breast pain in the puerperium because of possible serious adverse effects.
6. Acetaminophen and NSAIDs are equally, but only modestly, effective in treating uterine pain.
7. Pain after childbirth requires appropriate treatment as it coincides with new emotional, physical, and learning demands and may trigger postnatal depression.
8. Management of breast and nipple pain should target the cause.
9. Prescribing of medications during lactation requires consideration of transfer into breast milk, uptake by the baby, and potential adverse effects for the baby; available prescribing guidelines should be followed.
10. Acetaminophen and several NSAIDs, in particular ibuprofen, seem safe non-opioids in lactation.
11. Parenteral morphine, fentanyl, and other oral opioids including oxycodone are considered safe in lactation and should be preferred over meperidine (pethidine).
12. Local anesthetics appear safe in lactation.

II. Be aware of adverse physiological and psychological effects of acute pain and their modification for anesthetic (regional versus general) and analgesic techniques (Cousins and Power 1999; Kehlet 1998, 1999).

- A. Metabolic: substrate mobilization, catabolism (particularly protein wasting) mediated largely by hormone secretion (from the anterior and posterior pituitary, adrenal cortex and medulla, and pancreas) (Barratt et al. 2002).
- B. Cardiovascular: hypertension, tachycardia, myocardial ischemia (if coronary artery disease present), lowered fibrillation threshold (neurally and humorally mediated) (Cousins and Power 1999).
- C. Hypercoagulability: risks of thrombotic or embolic disease from immobilization, tissue injury, and hormonal (e.g., epinephrine) actions.
- D. Pulmonary compromise due to splinting and intrinsic diaphragmatic muscle impairment (Cousins and Power 1999; Rigg et al. 2002).
- E. Gastrointestinal dysfunction due to pain and pain therapies (especially opioids) (Kehlet 1999).
- F. Psychological distress and cognitive dysfunction due to pain and stress hormonal responses (e.g., hypoxia from splinting or hyponatremia due to excessive antidiuretic hormone secretion), anxiety, helplessness, insomnia, and pain therapies (Cousins and Power 1999).
- G. Predisposition to chronic pain due to central neuronal sensitization.

III. Be familiar with the pharmacological properties of the major classes of drugs used for acute pain management, beginning with usual starting doses, frequencies, and comparative (equivalent) doses (Cousins and Power 1999; MacIntyre and Ready 2003; Moore et al. 2003; ANZCA 2005; NHMRC 2005).

- A. For opioids, know:
1. Major chemical types, receptor selectivity, and agonist features (see Chapter 13) of compounds used, to permit rational drug substitution in the presence of adverse reaction or side effects from an agent of one type (e.g., a full agonist versus a mixed agonist-antagonist or partial agonist, or phenylpiperidine versus alkaloid versus peptide) (Moore et al. 2003).
 2. The wide range of durations of actions available through selection of ultra-short-acting (alfentanil, remifentanil) to ultra-long-acting (methadone) compounds.
 3. Common adverse effects (respiratory depression, sedation, constipation, nausea, pruritus, and urinary retention), including predisposing patient factors (e.g., prostatism, chronic lung disease) and concurrent drug therapies (e.g., anticholinergics, benzodiazepines), and how to evaluate and treat them.
 4. The dangers of sudden reversal of perioperative opioid therapy with naloxone (Cherny 1996).
 5. Benefits and risks of spinal opioids and evidence for and against the selection of spinal versus systemic routes of opioid administration for specific operative procedures and patients (e.g., comorbidity).
 6. How to approach the opioid treatment of acute pain in the opioid-tolerant patient, whether after deliberate, therapeutic chronic opioid therapy such as for cancer pain or in the known or suspected substance abuser (Mitra and Sinatra 2004). (See Chapter 44.)
 7. For patients able to take oral medications, and requiring ongoing management of severe acute pain, know when and how to convert from immediate-release oral opioids such as morphine and oxycodone to controlled-release (or slow-release) preparations (Ginsberg et al. 2003). Be aware of the need to educate ward staff about the differences in the use of immediate-release and controlled-release oral opioids and the dangers of confusing these two different types of preparation.
 8. Be aware of the evidence of efficacy of controlled release oral opioids in management of appropriately selected patients with acute pain (Sunshine et al. 1996; Reuben et al. 1999; Kampe et al. 2004).
 9. Acknowledge the special problems associated with opioid prescribing in patients with either opioid tolerance or substance abuse.
- B. With regard to the opioid-tolerant patient (see Chapter 44), understand that:
1. Opioid-tolerant patients report higher pain scores and have a lower incidence of opioid-induced nausea and vomiting.
 2. Usual preadmission opioid regimens should be maintained, where possible, or appropriate substitutions made.
 3. Opioid-tolerant patients are at risk of opioid withdrawal if non-opioid analgesic regimens or tramadol are used.
 4. PCA settings may need to include a background infusion to replace the usual opioid dose and a higher bolus dose.
 5. Neuraxial opioids can be used effectively in opioid-tolerant patients, although higher doses may be required, and these doses may be inadequate to prevent withdrawal.
 6. Ketamine may reduce opioid requirements in opioid-tolerant patients.
 7. Liaison with all clinicians involved in the treatment of the opioid-tolerant patient is important.
- C. With regard to patients with a substance abuse disorder (see Chapter 44):
1. Naltrexone should be stopped at least 24 hours prior to elective surgery.
 2. Patients who have completed naltrexone therapy should be regarded as opioid naive; in the immediate post-treatment phase they may be opioid-sensitive.
 3. Maintenance methadone regimens should be continued where possible.
 4. Buprenorphine maintenance may be continued; if buprenorphine is ceased prior to surgery, conversion to an alternative opioid is required.
 5. There is no cross-tolerance between central nervous system stimulants and opioids.

D. For nonselective NSAIDs and acetaminophen, know:

1. Different routes and dosage forms (e.g., oral, intravenous, rectal).
2. How to modify doses or withhold NSAIDs in the presence of patient comorbidity (congestive heart failure, renal disease, ulcer disease, coagulopathy) (ANZCA 2005; NHMRC 2005).
3. How to select particular NSAIDs to lessen the risk of specific side effects (e.g., nonacetylated compounds for platelet sparing; nabumetone to lessen gastrointestinal blood loss).
4. That there is a “plateau effect” such that dosage increases beyond the recommended range increase the incidence of side effects but do not improve analgesia (Souter et al. 1994).
5. The efficacy and utility of NSAIDs when administered via intra-articular, topical, and local infiltration routes (Tramer et al. 1998).
6. Pharmacokinetic profiles of the NSAIDs.
7. Controversies concerning NSAIDs and orthopedic surgery (Dumont et al. 2000).
8. Efficacy of NSAIDs for acute pain: aspirin, ibuprofen, diclofenac, piroxicam, naproxen, and ketorolac (ANZCA 2005).

E. For local anesthetics, know:

1. The anatomy of commonly used nerve blocks.
2. The major classes of agents, to guide drug substitution in the presence of allergy to one class (i.e., amino-ester versus amide).
3. The risks and benefits of addition of epinephrine, or combination analgesia (i.e., local anesthetic plus an opioid or NSAIDs).
4. The signs, symptoms, and treatment of systemic local anesthetic toxicity; the risk of toxicity in relation to selection of agent and site of administration; and how to distinguish such toxicity from other common adverse effects of local anesthesia (e.g., hypotension).
5. The indications, risks, benefits, and efficacy of local anesthetic application at common peripheral sites (brachial plexus, intercostal nerve, interpleural space) and epidurally.
6. Chirality in local anesthetic formulations. Additives in local anesthetic preparations and their clinical significance.

F. For tramadol, know:

1. Basic pharmacology
2. Adverse effects especially risk of serotonin syndrome
3. Drug interactions of importance
4. Dosage strategies
5. Efficacy in neuropathic pain

G. For ketamine, know:

1. Basic pharmacology (Schmid et al. 1999).
2. Side-effect profile
3. Dosage strategies
4. Difference between anesthetic and analgesic doses
5. Usefulness in nociceptive pain states

H. For the spinal and epidural routes of analgesia, know:

1. The risks and benefits of these routes of analgesia (Carr and Cousins 1998), noting especially the risks associated with using drugs by these routes, which were not designed for such use.
2. In particular, know the risks, and minimization of such risks, in patients under treatment with drugs altering the coagulation system (Horlocker et al. 1995, 2003; Horlocker and Wedel 1998).
3. The rationale for combinations of drugs used by the spinal and epidural routes (Walker et al. 2002).

4. The evidence for efficacy and side effects of individual agents (Carr and Cousins 1998) and combinations of agents (Walker et al. 2002). For example, be aware that there is weak and inconsistent evidence that the addition of clonidine to an epidural or intrathecal opioid is more effective than clonidine or the opioid alone.
 5. Epidural and intrathecal clonidine prolong the effects of local anesthetics.
 6. Epidural epinephrine in combination with a local anesthetic improves the quality of postoperative thoracic epidural analgesia. Intrathecal midazolam prolongs the analgesic effect of intrathecal opioids.
 7. Intrathecal neostigmine prolongs the analgesic effect of intrathecal morphine or bupivacaine.
 8. Intrathecal neostigmine is associated with an increased incidence of nausea and vomiting except at low doses.
 9. There is conflicting evidence of analgesic efficacy for the addition of clonidine to local anesthetic plexus blocks.
 10. The importance of protocols and procedures for safe management, pre-, intra-, and postoperatively, including the education and training of all staff involved.
 11. The key diagnostic features and appropriate management of important complications or concurrent problems that may arise in conjunction with such treatments including:
 - a. Epidural hematoma
 - b. Epidural abscess
 - c. Spinal nerve root(s) lesion(s)
 - d. Cauda equina syndrome
 - e. Transient neurological symptoms
 - f. Meningitis
 - g. Headache associated with intracranial hypotension
 - h. Limb compartment syndrome, potentially masked by excessive epidural analgesia
 - i. Temporary impairment of bladder function leading to a stretched bladder (Carr and Cousins 1998)
- G. For epidural analgesia, understand that:
1. For epidural analgesia, all techniques of epidural analgesia for all types of surgery provide better postoperative pain relief compared with parenteral opioid administration.
 2. Epidural local anesthetics improve oxygenation and reduce pulmonary infections and other pulmonary complications compared with parenteral opioids.
 3. Thoracic epidural analgesia utilizing local anesthetics improves bowel recovery after abdominal surgery.
 4. Thoracic epidural analgesia extended for more than 24 hours reduces the incidence of postoperative myocardial infarction.
 5. Epidural analgesia is not associated with increased risk of anastomotic leakage after bowel surgery.
 6. Thoracic epidural analgesia reduces the incidence of pneumonia and the need for ventilation in patients with multiple rib fractures.
 7. Lumbar epidural analgesia reduces graft occlusion rates after peripheral vascular surgery.
 8. Combinations of low concentrations of local anesthetics and opioids provide better analgesia than that provided by the individual compounds.
 9. The risk of permanent neurological damage in association with epidural analgesia is small; the incidence is higher where there have been diagnostic delays; and if indicated, immediate decompression (within 8 hours of the onset of neurological signs) increases the likelihood of partial or good neurological recovery.
 10. The provision of epidural analgesia by continuous infusion or patient-controlled administration of local anesthetic-opioid mixtures is safe on general hospital wards, as long as it is supervised by an anesthesia-based pain service with 24-hour medical staff coverage and monitored by well-trained nursing staff.

H. For intrathecal analgesia, understand that:

1. The combination of spinal opioids with local anesthetics reduces dose requirements when compared to either drug given alone.
2. Intrathecal morphine at doses of 100–200 µg offers effective analgesia with a low risk of adverse effects.
3. Clinical experience with morphine, fentanyl, and sufentanil has shown no neurotoxicity or behavioral changes at normal clinical intrathecal doses.

I. For regional analgesia and concurrent anticoagulant medications, know that:

1. Anticoagulation is the most important risk factor for the development of epidural hematoma after neuraxial blockade.

J. For the COX-2 inhibitors (see Chapter 14), know:

1. Structural differences between these agents and conventional NSAIDs.
2. Selectivity for the COX-2 enzyme between different agents.
3. Comparisons between COX-2 inhibitors and nonselective NSAIDs in terms of analgesic activity and side-effect profile.
4. The pharmaco-economic impact of COX-2 inhibitors.
5. Opioid-sparing effects.
6. Controversies concerning COX-2 inhibitors (Kharasch 2004).

IV. Be able to formulate a comprehensive plan for optimal perioperative pain management based on the diagnosis of the type of pain and its cause, patient preference, physical and mental status, and available expertise and technology (ANZCA 2005; NHMRC 2005).

A. Know the indications and contraindications for use of the major drug classes available for acute pain management, and evidence for their costs and effectiveness when delivered by varied routes (e.g., systemic, spinal) and infusion patterns (e.g., bolus doses, continuous infusion, patient-controlled).

1. Local anesthetics
2. NSAIDs, COX-2 inhibitors, and acetaminophen
3. Opioids
4. Alpha-agonists
5. Others (e.g., tramadol, ketamine, lignocaine, anticonvulsants, and antidepressants)

B. For patient-controlled analgesia:

1. Know how to write a “PCA prescription” for opioid administration via systemic (intravenous, subcutaneous) or epidural routes
 - a. Bolus dose
 - b. Lockout interval
 - c. Basal infusion rate
 - d. Dosage limit per time interval (e.g., 4 or 8 hours)
1. Know how to titrate a PCA prescription according to clinical need.
2. Be familiar with the pros and cons (including expense) of different devices and drugs for systemic PCA used currently (electrical, mechanical) or by other routes of delivery (transbuccal, intranasal, transdermal iontophoretic, inhaled).
3. Know how to manage common problems associated with PCA use, such as: patients’ reluctance to use PCA, pruritus, and mechanical difficulties with button devices.
4. Appreciate the importance of preoperative education to maximize PCA effectiveness.
5. Appreciate problems associated with drug combinations used in PCA devices.

C. Be able to manage analgesia during the transitions from “nil by mouth” to oral intake, and from inpatient care through hospital discharge (Macintyre and Ready 2003).

- D. Be able to select drugs, and to adjust doses and delivery techniques, according to the specific needs of the particular patient under treatment (e.g., considering age, physical status, and mental status) and the available resources (e.g., personnel, expertise, budget, and monitoring) of the setting in which treatment will be provided.
- E. Be able to diagnose acute neuropathic pain (Cousins and Power 1999; NHMRC 2005) and select appropriate treatment options, alone or in combination, such as:
 - 1. Oral administration of anticonvulsant drugs such as carbamazepine, sodium valproate, and gabapentin (ANZCA 2005; NHMRC 2005)
 - 2. Oral tricyclic antidepressants, e.g., amitriptyline, nortriptyline (ANZCA 2005; NHMRC 2005)
 - 3. Oral membrane stabilizers e.g., mexiletine, flecainide
 - 4. Subcutaneous or intravenous lignocaine infusion (Brose and Cousins 1991)
 - 5. Subcutaneous or intravenous ketamine infusion
 - 6. Supplementary use of appropriate agents/routes from III–IV above depending upon the relative contributions of nociceptive, neuropathic, psychological, and environmental factors (Cousins and Power 1999; ANZCA 2005; NHMRC 2005).
- F. Be aware that any sudden or gradual increase in analgesic requirements postoperatively could be a warning that:
 - 1. A complication of the surgery has occurred such as leaking bowel anastomosis, compartment syndrome, or infection.
 - 2. A complication of the pain relief technique has occurred, such as epidural hematoma or abscess.
 - 3. The nature of the pain has changed, e.g., a neuropathic component has evolved, or psychological/environmental factors have assumed greater importance.
- G. Understand the need for increased opioid doses in patients with preexisting opioid treatment for cancer pain and chronic noncancer pain. There is a need for:
 - 1. Calculation of equivalent systemic dose for existing oral (or other route) opioids.
 - 2. Calculation of additional dose of opioid to cover new stimulus of postoperative pain.
- H. Understand the limitations of some alternative routes of opioid administration:
 - 1. Transdermal “skin patch.” There are long lag times to attain and recover from effective blood concentrations (note: standard opioid patches are not currently approved for acute pain).
 - 2. Sublingual, e.g., buprenorphine tablets: effective but with long duration effects. However, a partial agonist drug with a ceiling to side effects (e.g., oral transmucosal fentanyl citrate) is effective but has the potential for high peak concentrations and thus is not currently recommended for acute pain in opioid-naïve patients.
 - 3. Transpulmonary: an experimental method, with the potential of virtually 100% bioavailability for drugs such as morphine and fentanyl delivered by a computer-controlled system (Ward et al. 1997; Mather et al. 1998).
 - 4. Intranasal: an experimental method that has been reported for fentanyl, butorphanol, and meperidine (ANZCA 2005). Insufficient data are available for routine clinical use in acute pain.
- I. Nitrous oxide:
 - 1. Understand that nitrous oxide (N_2O) is an effective analgesic during labor and is an effective analgesic agent in a variety of other acute pain situations.
 - 2. Neuropathy and bone marrow suppression are rare but potentially serious complications of nitrous oxide use, particularly in at-risk patients.
 - 3. The information about the complications of nitrous oxide comes from case reports only. There are no controlled studies that evaluate the safety of repeated intermittent exposure to nitrous oxide in humans and no data to guide the appropriate maximum duration or number of times a patient can safely be exposed to nitrous oxide.

4. The suggestions for the use of nitrous oxide are extrapolations only from the information above. Consideration should be given to duration of exposure and supplementation with vitamin B₁₂, methionine, and folic or folinic acid.
5. If nitrous oxide is used with other sedative or analgesic agents, appropriate clinical monitoring should be used.

J. Progression from acute to chronic pain:

1. Chronic postsurgical pain is common, may be severe, and may lead to significant disability (Macrae 2001).
2. Risk factors that predispose patients to the development of chronic postsurgical pain include the severity of pre and postoperative pain, intra-operative nerve injury, and psychological vulnerability.
3. Specific early analgesic interventions may reduce the incidence of chronic pain after surgery.
4. Many patients suffering chronic pain relate the onset to an acute incident.

K. Preemptive and preventive analgesia:

1. Understand that the timing of a single analgesic intervention (pre- versus postincisional), defined as preemptive analgesia, does not have a clinically significant effect on postoperative pain relief. Evidence for and against preemptive analgesia to avert central sensitization (Kissen 2000; Perkins and Kehlet 2000; Ballantyne 2001; Katz and McCartney 2002; Moiniche et al. 2002; Siddall and Cousins 2004).
2. There is evidence that some analgesic interventions have an effect on postoperative pain or on analgesic consumption that exceeds the expected duration of action of the drug, defined as preventive analgesia.
3. NMDA (*N*-methyl-D-aspartate) receptor antagonist drugs in particular may show preventive analgesic effects.

V. Be familiar with nonpharmacological methods of acute pain control.

A. Know that:

1. Combined sensory-procedural information is effective in reducing pain and distress.
2. Training in coping methods or behavioral instruction prior to surgery reduces pain, negative affect and analgesic use.
3. Hypnosis and attentional techniques reduce procedure-related pain.

B. Transcutaneous electrical nerve stimulation (TENS):

1. Be aware of evidence for and against its efficacy (compared to sham TENS or no TENS).
2. Know techniques of its use (electrode placement and stimulation parameters).
3. Know that certain stimulation patterns of TENS may be effective in some acute pain settings.

C. Acupuncture:

1. Know that acupuncture may be effective in some acute pain settings.

D. Cognitive-behavioral treatment:

1. For cognitive-behavioral methods (including patient education, relaxation, distraction), know the major approaches, techniques, limitations (e.g., severe pain intensity, or cognitive impairment) and clinical research that favors or opposes their use for acute pain (Carr and Goudas 1999).

VI. Know the clinical outcomes (e.g., length and cost of hospitalization, complications due to untreated pain or pain treatments, readmission due to inadequate pain control, patient satisfaction, and staff satisfaction) to be evaluated in an organized approach to acute pain management (Miaskowski 1994).

- A. Know the types of monitoring (e.g., sedation level, respiratory rate, and vital signs), including the frequency of assessment and institutional assignment of responsibility for performance that have been recommended by major professional organizations concerned with control of acute pain (ANZCA 2005).
 - B. Know how to organize an acute pain service that supervises the quality of pain management within an institution, documents institutional performance, ensures the quality of this function, and (if shortfalls arise) recognizes them and prevents their recurrence (Werner et al. 2002).
- VII. Assessment and measurement of acute pain and its treatment
- A. Understand that there is good correlation between the categorical and numerical rating scales, including the visual analogue scale.
 - B. Understand that pain intensity should be recorded as “the fifth vital sign” in all patients because regular assessment of pain leads to improved acute pain management. Self-reporting of pain should be used whenever appropriate because pain is by definition a subjective experience.
 - C. Understand that the pain measurement tool chosen should be appropriate to the individual patient. Developmental, cognitive, emotional, and cultural factors should be considered.
 - D. Scoring should incorporate different components of pain. In the postoperative patient this should include static pain (pain at rest) and dynamic pain (e.g., pain on sitting or coughing).
 - E. Uncontrolled or unexpected pain requires a reassessment of the diagnosis and consideration of alternative causes for the pain (e.g., a new surgical/ medical diagnosis, neuropathic pain).
- VIII. Educational objectives
- A. Appreciate the importance of preoperative education to reduce patient anxiety and improve the efficacy of postoperative analgesic strategies.
 - B. Understand that patients, unless told otherwise, generally have an expectation that they will have to endure postoperative pain and that it will be severe (Warfield and Kahn 1995).
 - C. Understand that preoperative education improves patient or parent knowledge of pain and enhances positive attitudes toward pain relief.
 - D. Staff education and the use of guidelines improve pain assessment, pain relief, and prescribing practices.
 - E. Appreciate that even “simple” techniques of pain relief can be more effective if attention is given to education documentation, patient assessment, and provision of appropriate guidelines and policies.
 - F. Understand that successful management of acute pain requires close liaison with all personnel involved in the care of the patient and that the major impediment to effective acute pain management is the lack of organization and delivery of pain relief rather than the analgesic techniques themselves.
- IX. Nonsurgical (medical) pain. Understand that acute pain management is not restricted to the treatment of postsurgical pain. There are several nonsurgical and medical conditions that require specialized acute pain management (NHMRC 2005):
- A. Pain associated with acute spinal cord injury (Attal et al. 2000; Cardenas et al. 2002; Sindrup and Jensen 1999; Siddall et al. 2002).
 - 1. Understand that intravenous opioids, ketamine, and lignocaine decrease acute spinal cord injury pain.
 - 2. Know gabapentin can be effective in the treatment of acute spinal cord injury pain. Treatment of acute spinal cord pain is largely based on evidence from studies of other neuropathic and nociceptive pain syndromes.

- B. Pain associated with acute burns and burns dressings (Jonsson et al. 1991; Choiniere et al. 1992; Long et al. 2001).
 - 1. Understand that opioids, particularly via PCA, are effective in burn pain, including procedural pain.
 - 2. Acute pain following burn injury can be nociceptive and/or neuropathic in nature and may be constant (background pain), intermittent, or procedure-related.
 - 3. Acute pain following burn injury requires aggressive multimodal and multidisciplinary treatment.
 - 4. Despite adequate treatment, pain after burns may become chronic.
- C. Acute lower back pain (Kendall et al. 1997; NHMRC 2005).
 - 1. It is important to rule out serious causes (“red flags”).
 - 2. Acute low back pain is nonspecific in about 95% of cases, and serious causes are rare; common findings also occur in asymptomatic controls and may not be the cause of pain.
 - 3. Advice to stay active, heat wrap therapy, “activity-focused” printed and verbal information, and behavioral therapy interventions are beneficial in acute low back pain.
 - 4. Advice to stay active, exercises, multimodal therapy, and pulsed electromagnetic therapy are effective in acute neck pain.
 - 5. Soft collars are not effective for acute neck pain.
- D. Acute herpes zoster infection (Wood et al. 1996; Jackson et al. 1997; Hwang et al. 1999).
 - 1. Understand that antiviral agents started within 72 hours of onset of rash accelerate acute pain resolution and may reduce the severity and duration of postherpetic neuralgia.
 - 2. Amitriptyline given in low doses from the onset of rash for 90 days reduces the incidence of postherpetic neuralgia.
 - 3. Topical aspirin is an effective analgesic in acute zoster.
 - 4. Sympathetic blocks are effective in acute zoster pain in provision of early and appropriate analgesia as an important component of the management of acute zoster and may have benefits in reducing postherpetic neuralgia.
- E. Pain associated with acute myocardial ischaemia and infarction (O’Leary et al. 1987; Baumann et al 2000; Schifferdecker and Spodick 2003).
 - 1. Morphine, beta blockers, and nitroglycerin are effective and appropriate agents in the treatment of acute ischemic chest pain.
 - 2. The mainstay of analgesia in acute coronary syndrome is the restoration of adequate myocardial oxygenation, including the use of supplemental oxygen, nitroglycerin, beta blockers, and strategies to improve coronary vascular perfusion.
- F. Acute cancer pain (McQuay and Jadad 1994; Soares et al. 2003).
 - 1. Understand that oral transmucosal fentanyl is effective in treating acute breakthrough pain in cancer patients.
 - 2. Analgesic medications prescribed for cancer pain should be adjusted to alterations of pain intensity.
 - 3. Opioid doses for individual patients with cancer pain should be titrated to achieve maximum analgesic benefit with minimal adverse effects. 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 assessed and treated immediately.
 - 4. Cancer patients on opioid analgesia need access to immediate-release opioids for breakthrough analgesia; if the response is insufficient after 30 minutes, administration should be repeated.
 - 5. Breakthrough analgesia should be one-sixth of the total regular opioid dose in patients with cancer pain. If nausea and vomiting accompany acute pain, parenteral opioids are needed to treat acute cancer pain.

- G. Pain syndromes in patients with HIV/AIDS (Kaplan et al. 1996; Shlay et al. 1998). Know that:
1. Neuropathic pain is common in patients with HIV/AIDS.
 2. In the absence of specific evidence, the treatment of pain in patients with HIV/AIDS should be based on similar principles to those for the management of cancer pain.
 3. Interaction between antiretroviral and antibiotic medications and opioids should be considered in this population.
- H. Pain associated with hematological disorders such as sickle cell disease and hemophilia (Ballas and Delengowski 1993; Yaster et al. 1994; Weiner et al. 2003). Know that:
1. Hydroxyurea is effective in decreasing the frequency of acute crises and life-threatening complications.
 2. Know transfusion requirements in sickle cell disease.
 3. Intravenous opioid loading optimizes analgesia in the early stages of an acute sickle cell crisis. Effective analgesia may be continued with intravenous (including PCA) opioids such as morphine; however, meperidine should be avoided.
 4. Intravenous ketorolac or methylprednisolone may decrease acute pain in sickle cell crises.
 5. Oxygen supplementation during a sickle cell crisis does not decrease pain.
- I. Abdominal pain of nonsurgical origin such as dysmenorrhoea, renal and biliary colic, and irritable bowel syndrome (Larkin and Prescott 1992; Labrecque et al. 1994; Poynard et al. 2001; Kim et al. 2002; Marjoribanks et al. 2003). Know that:
1. Analgesics do not interfere with the diagnostic process in acute abdominal pain.
 2. NSAIDs are superior to opioids in the treatment of renal colic.
 3. The onset of analgesia is fastest with intravenous NSAIDs in renal colic.
 4. Antispasmodics and peppermint oil are effective in the treatment of acute pain in irritable bowel syndrome.
 5. NSAIDs and vitamin B₁ are effective in the treatment of primary dysmenorrhoea.
 6. There is no difference between meperidine and morphine in the treatment of renal colic.
 7. Ketorolac is as effective as meperidine in the treatment of biliary colic.
- J. Pain associated with acute orofacial conditions such as sinusitis and oral ulceration.
1. NSAIDs, COX-2 selective inhibitors, acetaminophen, opioids, and tramadol provide effective analgesia after dental extraction.
 2. NSAIDs and COX-2-selective inhibitors provide better analgesia with fewer adverse effects than acetaminophen, acetaminophen/opioid combinations, acetaminophen/tramadol combinations, tramadol, or weaker opioids after dental extraction.
 3. Rofecoxib has an extended duration of analgesia following dental extraction.
 4. Perioperative local anesthetic infiltration does not improve analgesia after tonsillectomy.
 5. Aspirin and NSAIDs increase the likelihood of reoperation for post-tonsillectomy bleeding.
 6. PCA opioids may treat pain effectively in acute mucositis.
 7. Perioperative dexamethasone administration reduces acute pain, nausea, and swelling after third-molar extraction.
 8. Topical treatments may provide analgesia in acute oral ulceration.
 9. Recurrent or persistent orofacial pain requires biopsychosocial assessment and appropriate multidisciplinary approaches.
 10. Neuropathic orofacial pain (atypical odontalgia, phantom pain) may be exacerbated by repeated dental procedures, incorrect drug therapy, or psychological factors.
- K. Pain management of acute headache including the management of migraine, cluster headache and post-dural puncture headache (PDPH) (see Chapter 37). Know that:
1. Triptans are effective in the treatment of severe migraine.

2. Aspirin-metoclopramide is effective in the treatment of migraine with mild symptoms.
3. The addition of caffeine to aspirin or acetaminophen improves analgesia in acute tension-type headache.
4. The incidence of PDPH may be reduced by using small-gauge needles with a non-cutting edge.
5. There is no evidence that bed rest is beneficial in the treatment and prevention of PDPH.
6. Further high-quality trials are required to determine the efficacy of epidural blood patch administration in the treatment of PDPH.
7. Ibuprofen and acetaminophen are effective in the treatment of migraine with mild symptoms.
8. A “stratified care strategy” is effective in treating migraine.
9. Simple analgesics such as aspirin, acetaminophen, and NSAIDs, either alone or in combination, are effective in the treatment of episodic tension-type headache.
10. Sumatriptan is effective in the treatment of cluster headache.
11. Oxygen is effective in the treatment of cluster headache.
12. Opioids should be used with extreme caution in the treatment of headache, and meperidine should be avoided.

L. Acute musculoskeletal pain:

1. Understand that topical and oral NSAIDs improve acute shoulder pain.
2. Subacromial corticosteroid injection relieves acute shoulder pain in the early stages.
3. Exercises improve acute shoulder pain in patients with rotator cuff disease. Therapeutic ultrasound may improve acute shoulder pain in calcific tendonitis.
4. Advice to stay active, exercises, injection therapy, and foot orthoses are effective in acute patellofemoral pain.
5. Low-level laser therapy is ineffective in the management of patellofemoral pain.
6. A management plan for acute musculoskeletal pain should comprise the elements of assessment (history and physical examination, but ancillary investigations are not generally indicated), management (information, assurance, advice to resume normal activity, and pain management), and review to reassess pain and revise the management plan.
7. Information should be provided to patients in correct but neutral terms, avoiding alarming diagnostic labels to overcome inappropriate expectations, fears, or mistaken beliefs.
8. Treat pain with acetaminophen; if it is ineffective, NSAIDs may be used.
9. Oral opioids, preferably short-acting agents at regular intervals, may be necessary to relieve severe acute musculoskeletal pain; any ongoing need for such treatment requires reassessment.
10. Adjuvant agents such as anticonvulsants, antidepressants, and muscle relaxants are not recommended for the routine treatment of acute musculoskeletal pain.

M. Acute pain management in intensive care. Know that:

1. Pain relief needs should be considered and assessed in all patients throughout their stay in intensive care.
2. Daily interruptions of sedative infusions reduce the duration of ventilation and length of stay in the intensive care unit without causing adverse psychological outcomes.
3. Gabapentin and carbamazepine are effective in reducing the pain associated with Guillain-Barré syndrome.
4. Patients should be provided with appropriate sedation and analgesia during potentially painful procedures.
5. Observation of behavioral and physiological responses permits assessment of pain in unconscious patients.
6. When painful procedures are performed on sedated patients in intensive care, appropriate efforts should be made to deepen sedation or provide analgesia or local anesthesia.

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