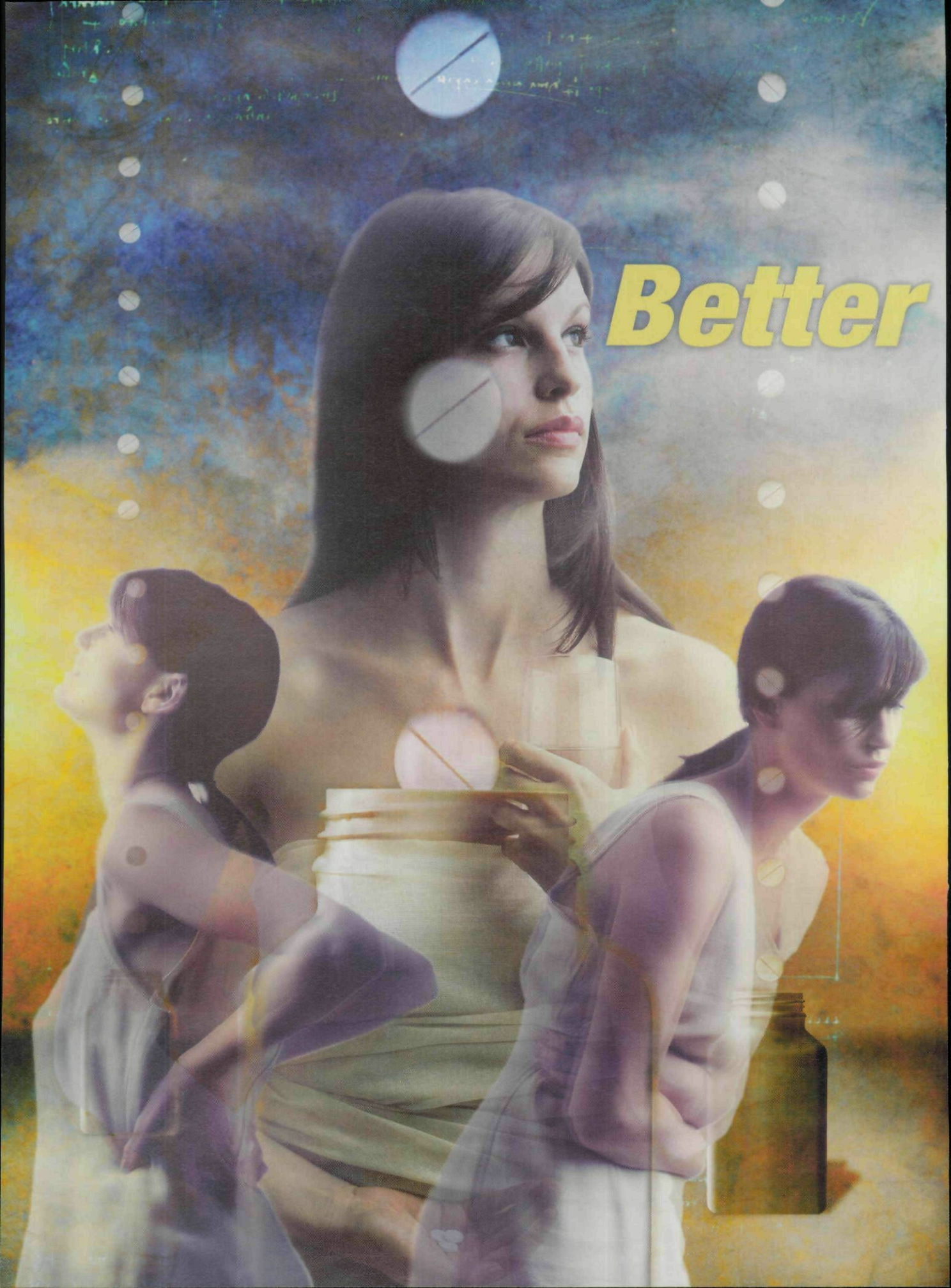
Better

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pain management

Pain is no longer considered a by-product of disease, but an illness unto itself. As clinicians, we're challenged to adequately assess and reassess it.

By **Kathy A. Cadden** RN, CCRN, MSN

Pain is in the top percentile of reasons for seeking medical care, yet it's significantly undertreated in 9 of 10 sufferers in the United States.[1-3] Approximately 75% of postoperative patients report experiencing moderate to severe pain even after receiving some form of analgesia.[4] Research indicates that pain is experienced by as many as 58% to 91% of hospitalized patients.[5]

Pain is a complex and multidimensional experience, which is affected by physical, psychological, emotional, and cultural factors. The American Pain Society (APS) identifies the most common reason for unrelieved pain in U.S. hospitals as the failure of healthcare providers to adequately assess and reassess it. This process may be further complicated by the need for diversity in validated pain assessment tools, for both cognitively intact patients and those unable to self-report or those impacted by cultural influences.

Pain classifications

The nature of an individual's pain may be acute, chronic, or acute-on-chronic. Pain may be nociceptive in origin, neuropathic, or a combination of both. Anxiety and mood disturbances also impact the perception of pain and ultimately the delivery of adequate treatment modalities.[6,7]

Recommended pain treatment modalities—both pharmacologic and nonpharmacologic—depend on the duration and origin of the patient's pain experience. Acute pain is experienced for a relatively short time period and is associated with tissue injury and inflammation. It generally subsides as the healing process moves forward. Chronic pain lasts beyond the healing process and usually persists for more than 6 months. It may be continuous or intermittent and may or may not be associated with a chronic disease or injury.

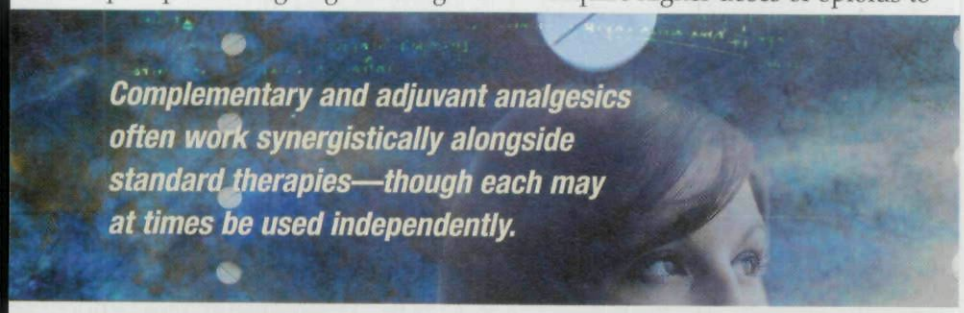
Persons living with chronic pain may have few or no outward signs, as they've learned to live with it for so long. Often, acute care patients have a combination of acute-on-chronic pain, such as the patient with cancer who gets admitted following a motor vehicle collision or pathological fractures. Both types of pain must be addressed in the acute care setting.

Specific subtypes

There are two distinct subtypes of pain: nociceptive and neuropathic. Nociceptive pain results from the normal processing and perception of pain and is the body's natural response to tissue injury or inflammation, which stimulates peripheral neurons. It may be somatic, arising from damage to musculoskeletal tissues, or visceral, arising from damage to visceral organs such as the pancreas and gastrointestinal (GI) tract. Nociceptive pain results from the normal processing and perception within the nervous system of stimuli that threaten or actually

cause tissue damage and is propagated by ongoing tissue injury.

Neuropathic pain is a heterogeneous condition initiated by a cascade of biologically related events that follow damage to the nervous system, pressure on tissues surrounding the neural tissue, or abnormal processing of impulses. The etiology and anatomical location of nerve injury may occur anywhere throughout the nervous system, from the peripheral receptor to the cerebral cortex. Unlike nociceptive pain, neuropathic pain doesn't provide a protective benefit and precipitates ongoing suffering.



Nociceptive and neuropathic pain may occur simultaneously and may be acute, chronic, or acute-on-chronic in nature.

Pharmacologic interventions

The cornerstone of pain management involves modifying the source of pain, altering its central perception, and blocking transmission within the nervous system. Traditionally, we've attempted this management by using pharmacotherapies. The two chief mechanisms of action for pharmacologic interventions include membrane stabilization and facilitation of descending inhibition mechanisms of pain perception in the dorsal horn of the spinal cord.[8]

Historically, the mainstay of pain management has been nonopioid analgesics. But now there's a new focus on complementary and adjuvant analgesic therapies. Complementary and adjuvant analgesics often work synergistically alongside standard therapies—though each may at times be used independently. Functionally, nonopioids, opioids, complementary analgesics, and adjuvant analgesics target different sites to reduce or eliminate pain.

Consistent with the World Health Organization guidelines, including an analgesic ladder viewed as the gold standard, opioid analgesics have long been considered the foundation of pain management for moderate or severe pain.[9] Patients with neuropathic pain generally require higher doses of opioids to achieve adequate analgesia. However, high doses of opioids heighten the associated risk of negative side effects and may alter treatment adherence. Opioid analgesics modulate the perception of pain by binding to mu, kappa, or delta opioid receptors in the periphery, dorsal horn, and central nervous system.[10] Side effects of most opioids include nausea, vomiting, itching, and ileus. Opioids have also been shown to affect the immune response, which might be undesirable in patients who may already be immunocompromised and at risk for acquiring opportunistic infections. Respiratory depression is also a known risk especially in the elderly and patients with obesity, sleep apnea, and impaired organ function. Opioid use in conjunction with sedative and hypnotic agents also increases the risk of respiratory depression.[11]

Adjuvant analgesics are often used in combination with opioid analgesics to manage pain. Tricyclic antidepressants are considered the first-line systemic treatment for many neuropathic pain syndromes. Neuropathic pain generally responds more rapidly than depression to tricyclic antidepressants—often within 3 to 10 days, compared with 2 to 3 weeks for the antidepressant effects. Additionally, the effective dose is generally one-third to one-half that required to manage depression.

To diminish the known anticholinergic side effects and accomplish full therapeutic value of this treatment, dosing at bedtime is recommended. Tertiary amine tricyclic antidepressants (amitriptyline, imipramine, doxepin) appear to have slightly superior efficacy compared with secondary amine tricyclic antidepressants (desipramine, nortriptyline). However, secondary amine tricyclic antidepressants have a lower side-effect profile.[12]

Anticonvulsants represent another class of medications that are used as a single agent or used in conjunction with opioid analgesics, with demonstrated efficacy in managing pain.[13] Phenytoin, carbamazepine, clonazepam, valoproate, felbamate, lamotrigine, oxcarbazepine, and gabapentin are anticonvulsants that have demonstrated efficacy in treating a range of neuropathic pain. Older anticonvulsants, such as phenytoin, carbamazepine, clonazepam, and valoproate have an associated risk of hematologic and hepatic complications that limit their usefulness in the cancer population.

Antiarrhythmic agents, lidocaine being the prototype, block ectopic neuronal activity at peripheral and central sites through sodium channel blockade. Antiarrhythmics suppress spontaneous impulse generation from injured nerve segments and the dorsal horn, creating nondepolarizing conduction of action potentials

and alleviating neuropathic pain from peripheral nervous system injury.[8] The pharmacologic class of antiarrhythmics is often a second-line adjuvant analgesic intervention in neuropathic pain.

Contraindications to the use of intravenous (I.V.), subcutaneous, and oral antiarrhythmic therapy include cardiac conduction disturbances, myocardial depression, and hypersensitivity to amide-type anesthetics.[12]

Treatment options

Topical analgesic agents are particularly useful in the medically ill who may be unable to tolerate the potential side effects of systemic adjuvant therapies. Three classes of topical preparations have demonstrated usefulness in neuropathic pain: local anesthetics, topical anti-inflammatory agents, and capsaicin.

1. Local anesthetics applied as a topical mixture or patch interfere with the ionic exchange of sodium channels blocking the transduction of pain from the peripheral nervous system to the central nervous system. Systemic side effects occurring with systemic lidocaine or mexiletine therapy are limited in topical use, and extended duration of therapy is safe.[14]

2. Formulations containing anti-inflammatory drugs such as aspirin, indomethacin, and diclofenac reduce inflammation irritating peripheral nerve endings. Topical anti-inflammatory agents are effective in reducing neuropathic pain associated with acute herpetic neuralgia and postherpetic neuralgia.[13]

3. Topical capsaicin is a derivative of chili peppers that, applied topically over a period of time, is effective in depleting the neurotransmitter substance P in primary afferent neurons and interfering with activation of peripheral nociceptors.[15] Topical capsaicin has been helpful in postherpetic neuralgia, postmastectomy pain, and painful diabetic neuropathy. Initial application of topical capsaicin has been known to cause local burning with a subsequent high rate of discontinuation of therapy.

Ketamine and dextromethorphan are pure N-methyl-D-aspartate (NMDA) receptor antagonists; their primary mechanism of action is through blocking the NMDA receptor activation. The introduction of NMDA receptor antagonists reduces escalating neuropathic pain and correlates with a reduced need for opioid analgesics.[16] Ketamine, a general anesthetic, is efficacious at subanesthetic doses in controlling pain but has an inherent risk of psychotomimetic effects. Dextromethorphan is commonly used as a cough suppressant with a good safety profile.[16]

Methadone is an NMDA receptor antagonist with a long elimination half-life and potential drug interactions, but it's effective in cancer pain management. Methadone is one-tenth the cost of other opioids and a good pharmacoeconomic choice in pain management.

Baclofen is an example of a GABAergic agonist. The primary mechanism of action of baclofen is to hyperpolarize inhibitory neurons in the spinal cord thereby reducing pain. Baclofen has been primarily tested in episodic lancinating and paroxysmal pain as a second-line treatment. Abrupt discontinuations of baclofen, like many of the adjuvant analgesics, can precipitate hallucinations, anxiety, and withdrawal syndromes.[8]

The class of alpha-$_2$-adrenergic agonists may be administered either transdermally or by spinal route and is usually reserved for use when other adjuvant therapies have failed. Clonidine is effective in pain syndromes that are minimally responsive to opioids, including neuropathic cancer pain. The exact mechanism of action is unknown. Alpha$_2$-adrenergic agonists have a high propensity toward orthostatic hypotension and should be monitored closely.

Cannabinoids have been used for a long time in cancer symptom management. Cannabinoids may produce an antianalgesic and antihyperalgesic effect in peripheral, spinal, and supraspinal sites by tonically modulating nociceptive thresholds.[17] Additionally, cannabinoids used in combination with opioid analgesics have a synergistic effect.

Nonopioids such as acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen are the first choice for mild pain. These medications are excellent in relieving bone pain, superficial pain, and muscle pain. They may be administered PRN for occasional pain or around the clock for ongoing pain. A maximum daily dose is recommended for each medication. Total daily dose of acetaminophen in adults should not exceed 4,000 mg in 24 hours due to the potential for hepatotoxicity. NSAIDs vary in time to onset and duration of analgesia. Generally, the longer the half-life of an NSAID, the slower the onset of analgesia. Likewise, the higher the dose, the faster the onset, the higher the peak effect, and the longer the duration. In patients with acute pain, there may be an advantage in starting with the highest approved dose of a short half-life drug and then adjusting the dose downward.

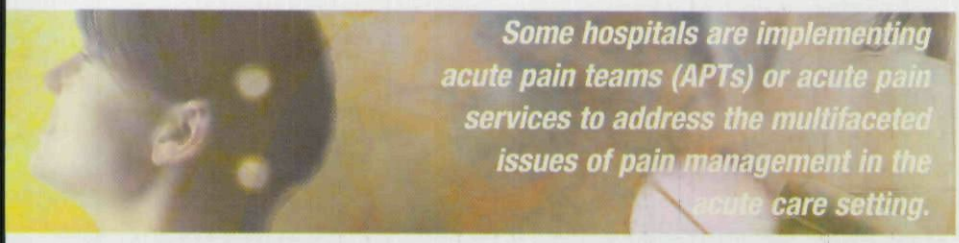
NSAIDs are associated with GI toxicity, including ulcers, GI bleeding, and systemic interference with platelet aggregation. Short-term use of NSAIDs is rarely associated with serious effects on the GI system, platelets, renal function, or bleeding processes. However, NSAID use is contraindicated in patients with active or recent GI ulcers. Acetaminophen may be an effective alter-

native. Ketorolac is frequently the NSAID of choice in acute care settings because it may be administered parenterally, unlike other NSAIDs.

Patient-controlled options

Healthcare consumers have increasingly demanded quality services and more control over their treatment during the past few decades. To meet this demand, technological advances continue to produce patient-controlled analgesia (PCA) systems using opioid agents that are increasingly safe, dependable, and cost effective.

Intravenous PCA has become the standard in opioid delivery systems in the acute care setting, particularly in the postoperative patient population, once initial pain control has been attained using I.V. bolus doses of analgesics. Specialized I.V. infusion pumps are programmed by the staff to specific healthcare provider parameters and may be used with opioids such as morphine, fentanyl, and dilaudid. Drawbacks include programming errors, the need for continuous I.V. access, use of the handset by persons other than the patient (such as family members by patient proxy), risks of catheter infiltration and phlebitis, and mobility limitations caused by the I.V. PCA pump and pole, I.V. lines, and power cables.[4]



Fentanyl HCl patient-controlled transdermal system (PCTS) is a noninvasive, self-contained, needle-free, credit card-sized fentanyl delivery system applied to the patient's upper arm or chest via an adhesive backing. The PCTS consists of a battery-powered anode hydrogel containing fentanyl HCl and a cathode hydrogel, an on-demand medication delivery button, and a red LED flasher. When the patient presses the on-demand button, the PCTS transfers a preprogrammed dose of fentanyl from the gel reservoir into the systemic circulation via an imperceptible current applied to drive the charged fentanyl molecules across the epidermis at a controlled rate. Studies have shown that absorption of fentanyl via the PCTS is as safe and effective as I.V. morphine for acute pain providing optimal pain relief in postoperative patients compared with control groups receiving placebo.[18,19] Because the fentanyl PCTS is preprogrammed, risk of medication errors is decreased. Mobility isn't limited as with I.V. PCA or patient-controlled epidermal analgesia, and less clinical resources are required for the application of the PCTS, leaving more time for staff to devote to other areas of patient care.[4] Current PCTA studies have been limited to specific patient populations, and more studies of the safety and efficacy of patient-controlled intranasal analgesia and PCTS are needed on a wider variety of patient populations.

When patients lose the ability to self-rate pain, it has been proposed that behavioral and physiologic variables be monitored to aid care providers in understanding ones level of discomfort. Behavioral manifestations of pain include facial expression, body movements, muscle tone, compliance with ventilation, and consolability. Vital signs, particularly heart rate and blood pressure changes, are physiologic manifestations of acute pain.[20]

The decade of advancement

The calendar decade beginning January 1, 2001, has been designated by Congress as the "Decade of Pain Control and Research." This concept created by the Pain Care Coalition—a joint effort by the American Society of Anesthesiology, the American Academy of Pain Medicine, and the American Headache Society—with the support from the APS aims to enhance public awareness and government support for the improvement of pain management within the United States. Four established areas of focus include pain research, professional awareness, policy, and public awareness.[21] This program constitutes a major step forward in the pain management movement.

In response, some hospitals are implementing acute pain teams (APTs) or acute pain services to address the multifaceted issues of pain management in the acute care setting.[22,23] APTs offer nurses specializing in pain, anesthetists, psychologists, spiritual care staff, and pharmacists—with the patient as an active team member. In addition to their role in the delivery of the newest analgesic techniques, members are responsible for the introduction and implementation of protocols and guidelines, provision of in-service training for medical and nursing staff, daily pain rounds, and research in relation to acute pain management effectiveness.[22] Methodist Hospital, Houston, Texas, successfully implemented an APT to bolster staff commitment to control pain more effectively. Subsequently, patient satisfaction scores rose from 72.4% to 86% in only 3 months following implementation.[24]

Although we've made great advances in pain management, we're nowhere near completion.

Further research and education of the public and healthcare practitioners are necessary in all areas of pain assessment, treatment, and control. NM

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The author discloses that she has no significant relationship with or financial interest in any commercial companies that pertain to this educational activity.

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Better pain management

GENERAL PURPOSE: To provide the registered professional nurse with information about the pain experience and interventions for pain management.
LEARNING OBJECTIVES: After reading the preceding article and taking the following test, the nurse will be able to: **1.** Discuss general concepts related to the pain experience. **2.** Describe pharmacologic interventions and patient-controlled options for pain management.

1. The American Pain Society identifies the most common reason for unrelieved pain in U.S. hospitals as the failure of
a. healthcare providers to adequately assess and reassess it.
b. healthcare providers to adequately treat it.
c. patients to adequately describe it.
d. patients to ask for, and use, pain relief measures.

2. Recommended pain treatment modalities depend on
a. pain perception of the patient.
b. prescriber's preference.
c. duration and origin of the patient's pain experience.
d. mood disturbance experienced by the patient.

3. Which disorder causes nociceptive pain?
a. diabetic neuropathy
b. shoulder dislocation
c. phantom limb pain
d. trigeminal neuralgia

4. Which complementary alternative technique is well documented for relieving chronic cancer pain?
a. self-hypnosis
b. massage
c. meditation
d. acupuncture

5. The cornerstone of pain management involves each of the following *except*
a. blocking pain transmission within the nervous system.
b. modulating the metabolic pain responses.
c. altering the central perception of pain.
d. modifying the source of pain.

6. Which tool is the gold standard for achieving optimal pain management?
a. American Pain Society pain management guidelines
b. pain management recommendations from the American Academy of Pain Medicine
c. World Health Organization analgesic ladder
d. Pain Care Coalition analgesic and pain management flowchart

7. Which statement about opioid use is true?
a. Neuropathic pain generally requires lower opioid doses to achieve adequate analgesia.
b. Opioid analgesics are the foundation of pain management for moderate or severe pain.
c. Few opioids cause significant constipation problems.
d. Opioids and nonopioids work well together since they target the same sites to reduce pain.

8. Opioid use in conjunction with sedative and hypnotic agents increases the risk of
a. respiratory depression.
b. cardiac conduction disturbances.
c. immunosuppression.
d. nausea and vomiting.

9. The recommended dosing time for taking a tricyclic antidepressant for neuropathic pain is
a. in the morning before breakfast.
b. with each meal.
c. after each meal.
d. at bedtime.

10. Which drug class is often a second-line adjuvant analgesic intervention in neuropathic pain?
a. sedatives
b. anticonvulsants
c. antiarrhythmics
d. tricyclic antidepressants

11. Patients applying topical capsaicin should be instructed that
a. initial application may cause local burning.
b. it's not likely to be effective for diabetic neuropathy.
c. systemic side effects include constipation.
d. just one or two doses will bring effective relief.

12. Abrupt discontinuation of baclofen can precipitate
a. peripheral neuropathy.
b. respiratory depression.
c. gastrointestinal bleeding.
d. withdrawal symptoms.

13. Which statement about nonsteroidal anti-inflammatory drugs (NSAIDs) is true?
a. Nonopioids such as NSAIDs are the first choice for mild pain.
b. The longer the half-life of an NSAID, the faster the onset of analgesia.
c. Ketorolac is frequently the NSAID of choice in long-term care settings.
d. NSAIDs shouldn't be administered on an around-the-clock schedule.

14. Fentanyl HCl patient-controlled transdermal system should be applied to the patient's
a. lower back.
b. lower abdomen.
c. upper arm or chest.
d. upper thigh.

15. Which of the following is a physiologic manifestation of acute pain?
a. facial expression
b. blood pressure change
c. muscle tone
d. body movements

16. The "Decade of Pain Control and Research" concept
a. is an American Cancer Society initiative.
b. has resulted in development of acute pain teams in some hospitals.
c. provides money for development of new analgesics.
d. is focused only on professional awareness of pain issues.

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