Abstract

Patients who do not report pain and healthcare providers who fail to assess for pain are major barriers to the relief of pain. Using pain as the fifth vital sign and being knowledgeable about pain assessment and management can help nurses and other healthcare providers overcome many of the barriers to successful pain control. A successful pain control plan includes establishing the pain diagnosis, treating the cause of the pain when possible, optimizing analgesic use, implementing nonpharmacological interventions to maximize physical and psychological comfort and function, and referring the patient for invasive pain management options when indicated.

Pain as the Fifth Vital Sign

Pain is an everyday experience for many. For some, it is minor and temporary. For others, it is a major problem that may be difficult to resolve. It is one of the most common reasons for seeking healthcare. Acute and cancer pain result from disease, injury, and/or medical and surgical interventions. Chronic, noncancer pain may have no identifiable cause. Unrelieved pain can delay healing, alter immune function, and increase stress, as well as cause anxiety, depression, general physical and psychological decline, and economic adversity. Although most pain can be relieved using pharmacological, nonpharmacological, behavioral, and interventional techniques, only 50% of patients with pain report adequate pain relief. The most common barrier to effective pain management is the failure of healthcare providers to assess for pain and for the effectiveness of pain relief measures. Nurses can play an important role by assessing pain and ensuring that adequate pain relief measures are instituted.

PATHOPHYSIOLOGY OF PAIN

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of tissue damage. The sensory component of pain perception involves the peripheral and...
central nervous systems. Nociceptors are free endings of peripheral nerves that are stimulated by sufficient amounts of tissue-damaging or potentially tissue-damaging temperature, pressure, or chemical stimuli. When nociceptors are activated, various neurotransmitters such as prostaglandin, bradykinin, serotonin, substance P, and histamine are released. These substances further excite the nociceptors. Nociceptor excitation is picked up by peripheral afferent fibers and carried to the dorsal horn of the spinal column. At the dorsal horn, more neurotransmitters are released. At this point, the nociceptive message is either transferred by ascending nerve tracts to the higher centers of the brain where pain is perceived, or it is quieted by other neurotransmitters, including endogenous opioids that are released from nerve tracts descending from higher centers.

When the higher brain centers interpret a nociceptive message as painful, they also evoke the affective components of the pain experience. The emotional or affective components of pain perception are complicated. Previous pain and pain relief, the meaning of the pain to the patient, and how the pain affects quality of life are all aspects of the emotional response to pain. Cicely Saunders, the founder of hospice, uses the phrase “total pain” to emphasize the all-encompassing nature of pain as it impacts every aspect of quality of life: physical, emotional, social, and psychological.6 The toll of total pain is depicted in Ferrell’s quality of life model (Figure 1).7 Because pain is a multidimensional experience, comprehensive pain management may require an interdisciplinary team.

Because pain is subjective, it cannot be measured like blood pressure or weight or electrolyte values. Acute pain may activate the autonomic nervous system, resulting in changes in blood pressure and pulse rate and diaphoresis. However, these physiological signs and the behaviors commonly associated with acute pain (grimacing, groaning, and guarding) may be absent in those with chronic or cancer-related pain.

The patient’s report of pain is the most reliable indicator of a pain problem.7—10 However, many patients may be reluctant to admit to having pain. Patient reluctance to report pain may be caused by fear of:

- pain as an indication of worsening health problems;
- distracting healthcare providers from other pressing issues;
- the discomfort or expense of diagnostic testing or treatment of the underlying problem;
- addiction, side effects, or expense related to analgesic use;
- being viewed as a complainer.

Patients may be fatalistic. Some believe that their healthcare provider knows that their type of disease is painful and would provide relief if something could be done. Others may view pain and suffering as necessary to gain future or afterlife rewards.1,8 Providers may fail to adequately respond to reports of pain because of inadequate knowledge of pain management, fear of addiction or side effects related to analgesic use, or concern about regulatory scrutiny of prescriptive practices.4,9

The failure to assess for pain and for the effectiveness of pain relief measures is the most common barrier to successful pain control.5–8 In an effort to overcome this barrier and to make pain management a priority, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) standards now advocates assessment of pain as the fifth vital sign.10 Along with routine screening of blood pressure, temperature, pulse rate, and respiratory rate, patients should be asked about the presence of pain. If pain is present, a full assessment and development of a pain management plan will follow.

A complete pain assessment includes location of the pain and sites of referral; pain intensity using numerical, verbal, or other rating scales; time of onset, duration, and pattern of the pain; alleviating factors (what makes

![Quality of Life Model](https://example.com/quality_of_life_model.png)

**FIGURE 1.** Quality of life model. Adapted with permission © 1995. From Ferrell.7
the pain better); aggravating factors (what makes the pain worse); effect of pain on activities of daily living and quality of life; and side effects of analgesics or pain relief interventions. The simple mnemonic device, PAINED, provides a helpful reminder of the components of basic pain assessment (Table 1). Standardized assessment tools such as the Brief Pain Inventory and the McGill Pain Questionnaire may facilitate pain assessment. (See Table 2 for further information on selected pain assessment scales and tools.) Comprehensive pain assessment also includes a medical history, physical examination, diagnostic testing, and psychosocial evaluation.

Pain assessment does not stop with the initial assessment. Frequent and regular assessment for changes in the intensity, quality, and location of the pain and for side effects of pain management interventions is needed to maximize pain control while minimizing side effects.

Pain assessment provides the information needed to establish a pain diagnosis. This includes the type of pain and its known or suspected etiology. The pain diagnosis, like any medical or nursing diagnosis, guides the plan of care that will meet the patient’s goal for pain relief.

**TYPES OF PAIN**

Pain is classified broadly as nociceptive, neuropathic, or mixed nociceptive/neuropathic in nature. Nociceptive pain results from activation of nociceptors in somatic or visceral tissues and the transmission of that activation through an intact nervous system. Neuropathic pain is perceived when lesions or other damage to the nervous system result in abnormal processing of sensory input. Mixed pain has both nociceptive and neuropathic components. Because these different pain types respond best to different therapies, diagnosing the nature of the pain is an important part of pain management.

<table>
<thead>
<tr>
<th>TABLE 1</th>
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</thead>
<tbody>
<tr>
<td><strong>Pain Assessment: PAINED</strong></td>
</tr>
<tr>
<td><strong>P</strong>lace: Location of pain (may be more than 1 site)</td>
</tr>
<tr>
<td><strong>A</strong>mount of pain: Pain intensity score, duration of pain, pattern of onset (continuous, intermittent)</td>
</tr>
<tr>
<td><strong>I</strong>ntensifiers: What makes the pain worse (position, movement, time of day, etc)?</td>
</tr>
<tr>
<td><strong>N</strong>ullifiers: What makes the pain better (position, heat or cold, medications, etc)?</td>
</tr>
<tr>
<td><strong>E</strong>ffects of pain medication (relief, side effects), effect of pain on activities of daily living, quality of life</td>
</tr>
<tr>
<td><strong>D</strong>escription: Quality of the pain (dull, sharp, aching, stabbing, cramping, etc)</td>
</tr>
</tbody>
</table>

Once the pain diagnosis is made, a pain management plan is formulated. The goal of rational pain management is to achieve optimal comfort and function with minimal side effects from the analgesic therapy. A rational pain management plan includes treatment of the cause of the pain (if possible), optimal use of analgesic and adjuvant medications, use of nonpharmacological interventions, and referral for invasive approaches when appropriate (Table 3). Nonpharmacological interventions may include physical therapy and positioning to maintain function; heat or cold to reduce muscle aches, stiffness, or edema; massage for relaxation; mind–body techniques to decrease tension, anxiety, and pain; and psychosocial support to decrease overall...
suffering. Seventy-five percent to 85% of acute and cancer-related pain should be managed using disease-specific therapies, analgesics, and nonpharmacological interventions.\(^1\) If pain is poorly controlled despite optimal use of these three approaches, or if side effects prevent optimal use of medications, the healthcare provider should consider referring the patient for invasive or interventional approaches. Such approaches include nerve blocks, the administration of analgesics and local anesthetics via epidural and intrathecal catheters with implanted or external pumps, and neuroablative procedures such as cordotomy and rhizotomy.\(^1\) (pp100–101)

The use of medications is a major part of pain management.\(^1\) (p40),\(^5\) (p4) The World Health Organization (WHO) developed an analgesic ladder to guide the use of analgesics and adjuvants according to pain severity (Figure 2).\(^1\) (p41) The WHO ladder emphasizes the use of oral analgesics on a scheduled basis with attention to the patient’s response to the medication. It also emphasizes the combination of opioid, nonopioid, and adjuvant analgesic medications to provide the most effective pain control. Nonopioid medications are acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs). Adjuvants are medications that are not usually analgesic but may provide analgesia in specific circumstances. Tricyclic antidepressants and anticonvulsants are common adjuvants used for neuropathic pain.

Step 1 of the ladder advocates the use of nonopioid medications plus adjuvants if indicated for patients who

<table>
<thead>
<tr>
<th>TABLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Assessment Tools</td>
</tr>
</tbody>
</table>

**Verbal Scale**
- Please describe your average pain
  - None
  - Mild
  - Moderate
  - Severe
  - Excruciating

<table>
<thead>
<tr>
<th>Numeric Pain Intensity Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Pain</td>
</tr>
</tbody>
</table>

**Visual Analog Scale**
- No Pain
- Worst Pain

The following pain assessment tools are copyrighted and may be viewed on the Internet:
- Wong-Baker Faces Scale [www.genrx.com/Mosby/Wong](http://www.genrx.com/Mosby/Wong)
- McGill Pain Questionnaire [www.qlmed.org/MPQ](http://www.qlmed.org/MPQ)

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**PHARMACOLOGY OF PAIN MANAGEMENT**

The use of medications is a major part of pain management.\(^1\) (p40),\(^5\) (p4) The World Health Organization (WHO) developed an analgesic ladder to guide the use of analgesics and adjuvants according to pain severity (Figure 2).\(^1\) (p41) The WHO ladder emphasizes the use of oral analgesics on a scheduled basis with attention to the patient’s response to the medication. It also emphasizes the combination of opioid, nonopioid, and adjuvant analgesic medications to provide the most effective pain control. Nonopioid medications are acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs). Adjuvants are medications that are not usually analgesic but may provide analgesia in specific circumstances. Tricyclic antidepressants and anticonvulsants are common adjuvants used for neuropathic pain.

Step 1 of the ladder advocates the use of nonopioid medications plus adjuvants if indicated for patients who

**FIGURE 2.**
are not receiving analgesic therapy and have mild to moderate pain. Acetaminophen is available over the counter. It is an effective analgesic for mild to moderate pain. Individual doses greater than 1000 mg do not enhance analgesia. Total daily doses greater than 4000 mg are not recommended because of increased risk of hepatic toxicity, especially in patients with a history of alcohol abuse or liver disease. Nonsteroidal anti-inflammatory drugs are excellent analgesics for somatic pain. Most NSAIDs are available in oral dosing forms. Ketorolac (Toradol, Roche Laboratories, Nutley, NJ) also is available for intravenous use. It can provide analgesia equal to 10 mg of parenterally administered morphine, but dosing is limited to 30 mg every 6 hours for a maximum of 5 days because of significant gastrointestinal toxicity. No oral NSAID has clearly demonstrated analgesic superiority; therefore selection is based on individual preference and effectiveness, dosing schedule, toxicity profile, and expense. As with acetaminophen, all NSAIDs have ceiling (maximum) doses that, if exceeded, may precipitate toxicity without improving analgesia. Toxicities of NSAIDs include dyspepsia, gastric ulceration and bleeding, renal and hepatic impairment, bleeding due to inhibition of platelet function, and peripheral edema due to sodium and water retention. A new class of NSAIDs, the cox-2 inhibitors, is designed to provide analgesia with fewer side effects. Celecoxib (Celebrex, Searle, Ltd., Skokie, IL) and rofecoxib (Vioxx, Merck, Whitehouse Station, NJ) are cox-2 inhibitors that are approved by the Food and Drug Administration for management of arthritis pain. These medications appear to have milder gastrointestinal effects and minimal to no inhibition of normal platelet function. Nonsteroidal anti-inflammatory drugs may be contraindicated in patients with gastrointestinal bleeding or ulceration, bleeding disorders, or renal or hepatic impairment, and may be inappropriate for patients who are receiving anti-coagulation therapy.

Step 2 of the WHO ladder recommends the addition of a low-dose opioid to nonopioid and adjuvants if pain persists or is moderate to severe. Products that combine a nonopioid and low-dose opioid in a single tablet (acetaminophen/oxycodone, acetaminophen/hydrocodone, acetaminophen/codeine) are used commonly in step 2. The usefulness of these products is limited by the ceiling dose of acetaminophen. Clinically, a more effective strategy may be the use of short-acting opioid preparations on an as-needed basis with scheduled doses of nonopioids. Tramadol (Ultram, Ortho-McNeil Pharmaceutical, Raritan, NJ) is another analgesic that can be used in step 2. Tramadol works as a weak opioid receptor agonist and inhibits reuptake of serotonin and norepinephrine. It may be useful for patients who cannot tolerate NSAIDs and wish to defer use of strong opioids. At doses greater than 400 mg per day, tramadol has been associated with increased risk of seizures. Tramadol may increase sedation or cause withdrawal-type reactions if given in combination with opioids. Propoxyphene (Darvon, Eli Lilly, Indianapolis, IN) is used commonly for moderate pain. Because of its long half-life and the association of its active

### TABLE 3

**Rational Pain Management**

| T | TREATABLE CAUSES |
| O | OPTIMIZE ANALGESICS AND ADJUVANT MEDICATIONS |
| N | NONPHARMACOLOGICAL INTERVENTIONS |
| I | INVASIVE APPROACHES |

### TABLE 4

**Commonly Used Nonopioids**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Usual Dose (mg)</th>
<th>Maximum Dose (mg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen</td>
<td>650 every 4–6 hrs</td>
<td>4000</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>400–600 every 4–6 hrs</td>
<td>3200</td>
</tr>
<tr>
<td>Naproxen</td>
<td>250–500 2–3× daily</td>
<td>1200</td>
</tr>
<tr>
<td>Nabumetone</td>
<td>500–1000 2× daily</td>
<td>2000</td>
</tr>
<tr>
<td>Sulindac</td>
<td>150–200 2× daily</td>
<td>400</td>
</tr>
<tr>
<td>Ketorolac</td>
<td>10–30 IV every 6 hrs</td>
<td>120*</td>
</tr>
<tr>
<td>Choline magnesium trisalicylate</td>
<td>500–1500 2× daily</td>
<td>3000</td>
</tr>
<tr>
<td>Celecoxib</td>
<td>100–200 2× daily</td>
<td>†</td>
</tr>
<tr>
<td>Rofecoxib</td>
<td>25 daily</td>
<td>†</td>
</tr>
</tbody>
</table>

*Limit use to 5 days.
†Cross sensitivity to sulfagluralt. ‡Available as suspension.
metabolite, norpropoxyphene, with cardiac toxicity and pulmonary edema, short-term use is recommended.1(p71),17

Step 3 of the WHO ladder indicates the use of higher doses of opioids plus nonopioids and adjuvants if pain persists as moderate to severe. In clinical practice, this often means adding a long-acting opioid on a scheduled basis while continuing as-needed doses of a short-acting opiate. Scheduled doses of nonopioid and adjuvant analgesic are continued as appropriate.

### Opioids

Opioids are effective in controlling somatic and visceral pain, and they are at least partially effective in controlling neuropathic pain. Opioids produce analgesia by binding to receptors in the brain and spinal cord, thereby inhibiting or modulating nociceptive input. The opioids are classified according to receptor binding patterns as full or partial agonists. The partial agonists such as pentazocine, nalbuphine, and butorphanol are not used commonly for pain management.11,12,14,18 Morphine, hydromorphone, oxycodone, fentanyl, and methadone are full agonists that are used commonly in pain management. The full agonists have no maximum doses and will not reverse analgesia produced by other agonists. Although the full agonists have different pharmacological properties, they are similar in clinical effectiveness and side effects.

### Opioid Selection

Initial selection of an opioid is based on the drug’s pharmacokinetics (Table 5), suitability of available dosing forms, the patient’s experience with such medications, and cost. Morphine is the standard opioid.5(p3) As with all opioids, it is metabolized in the liver and excreted by the kidneys. Fentanyl has a short onset and duration of action, but because it is lipophilic (having an affinity for fat), it may cause delayed sedation and respiratory depression with repetitive or continuous administration. Methadone is inexpensive but has a long half-life that can lead to sedation from drug accumulation with repeated dosing. Codeine has limited usefulness in managing moderate to severe pain because increasing doses to above 65 mg may not increase analgesia but may substantially increase side effects.5(p3) Meperidine is not recommended as a routine analgesic because its short half-life requires frequent dosing, and accumulation of its active metabolite, normeperidine, increases the risk of agitation and seizures, especially in patients with renal impairment.

### Routes of Administration

The route of administration affects the onset and duration of the drug’s effect. The WHO ladder emphasizes the oral route of administration because it is convenient, effective, less costly, and acceptable to patients. Because oral opioids first undergo metabolism in the liver, their onset is later.
and duration of action longer than those of parenterally administered opioids. Morphine, oxycodone, and hydromorphone are available in tablets, capsules, and liquids for oral use. Concentrated liquid and soluble tablet opioid formulations can be given sublingually. An oral transmucosal fentanyl lozenge (Actiq, Abbott Laboratories, North Chicago, IL) is available for breakthrough cancer pain. Suppositories of morphine and hydromorphone are available for rectal administration. Their use may be contraindicated by anorectal disease, diarrhea, impaction, low leukocyte counts, or low platelet counts.1

Long-acting opioids include methadone (because of its long half-life), transdermal fentanyl, and oral sustained-release tablets or capsules of morphine, oxycodone, and hydromorphone (soon to be released). Sustained-release tablets should not be crushed, although a sustained-release morphine capsule, Kadian (Faulding-Purepac, Elizabeth, NJ), can be opened and its contents sprinkled on food or administered via feeding tube. The fentanyl transdermal delivery system (patch) provides sustained analgesia for managing chronic, stable pain. The pharmacokinetics of the fentanyl patch can be highly individual. Its onset of action is 12 to 24 hours, and the drug's effect may be sustained for an equal amount of time after patch removal.

Subcutaneous and intramuscular injections are not recommended for routine use because of discomfort associated with administration. However, continuous subcutaneous administration with or without patient-controlled analgesia can be accomplished with relative comfort. Intravenous administration is preferred for rapid titration of opioids to treat acute or severe pain. Intravenous dosing can provide intermittent boluses, continuous infusion, or patient-controlled analgesia via peripheral or central catheters.

**Opioid Dosing**

The key principle in opioid dosing is titration of the dose to effective pain relief or unacceptable side effects.1 Inadequate pain control usually is not a function of the particular opioid or route of administration but of inadequate dosing of the selected opioid. Because opioids have no maximum dose, dose increases should be made incrementally until pain is controlled or unacceptable side effects occur. Initial therapy in opioid-naïve patients begins with as-needed doses of short-acting medications. This establishes the amount of medication needed for analgesia. If frequent doses of short-acting opioid are required for adequate pain control, addition of background analgesia may improve pain control. Background analgesia is provided by scheduled doses of a long-acting opioid or a continuous subcutaneous or intravenous infusion. Doses of short-acting opioids are continued as needed for breakthrough pain. The 24-hour dosage of the background opioid should equal 75% to 100% of the sum of the doses of short-acting opioid consumed in 24 hours. When administered by nonparenteral routes, short-acting doses for breakthrough pain should equal 10% to 15% of the 24-hour dosage of background opioid and be available every 1 to 3 hours, depending on patient need. When administered by a parenteral route, rescue doses should equal 25% to 50% of the hourly continuous infusion rate and be available every 15 to 30 minutes for breakthrough pain.1-3 When a steady state of the opioid is achieved (1 to 3 days for long-acting products and 12 to 18 hours for IV opioids), the dosage of the background opioid should be titrated upward or downward to maintain effective analgesia with minimal side effects. The use of more than three to four doses of opioids for breakthrough pain in a day usually indicates the need to increase background analgesia. Appropriate adjustment of the breakthrough dose also should be made using the above guidelines.3 In general, a patient's pain management plan should include only one short-acting and one background opioid at a time. When possible, using the same opioid in background and breakthrough doses simplifies pain management decision-making.

**Equianalgesia**

The need to change opioid medication may arise if unacceptable side effects develop or if the route of administration is changed. Because opioids vary in the dose each requires to produce the same amount of pain relief, equianalgesic conversion charts are used to determine the dose of the new opioid that will provide pain relief equal to that of the previous opioid (Tables 6 and 7). The equianalgesic chart also is used to convert to and from oral and parenteral routes of administration. These charts are based on research and clinical experience and provide best estimates of starting doses of the new opioid or route. However, individual patient response guides titration to the effective analgesic dose. Although some experts recommend reducing the equianalgesic dose of a new opioid by 25% to 50% to account for incomplete cross-tolerance among opioids, the American Pain Society does not.5-9,14 Incomplete cross-tolerance means that another medication from the same class may have different effects and side effects for the patient.

**Tolerance, Physical Dependence, and Addiction**

Tolerance is adapting to the effects and side effects of a particular medication over time. Tolerance to the analgesic effects of a medication manifests as a need to increase doses or to shorten dosing intervals to maintain analgesia despite stable disease; tolerance is uncommon
Table 6

Equianalgesic Doses of Commonly Used Opioids

<table>
<thead>
<tr>
<th>Drug</th>
<th>Oral Dose</th>
<th>Intravenous Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>30 mg</td>
<td>10 mg</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>7.5 mg</td>
<td>1.5 mg</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>20 mg</td>
<td>N/A</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>* 100 μg</td>
<td>N/A</td>
</tr>
<tr>
<td>Methadone</td>
<td>20 mg</td>
<td>10 mg</td>
</tr>
</tbody>
</table>

N/A = not applicable.

*25 μg patch equals approximately 50 mg morphine orally daily.
†Methadone's potency (analgesia effect per given dose) and long half-life require particularly careful attention to titration of equianalgesic dosing.

Adapted with permission from Jacox et al.1 and the American Pain Society.5

in clinical practice.19 Tolerance to side effects is desirable and usual, allowing for increased doses over time without increased side effects.

Physical dependence is physiological adaptation to the presence of opioids in the body. It manifests as withdrawal symptoms if opioid administration is stopped suddenly, the dose is quickly and significantly decreased (> 50%), or an antagonist such as naloxone is given in the setting of chronic opioid use. Withdrawal symptoms include increased pain, anxiety, irritability, nausea, diarrhea, abdominal pain, diaphoresis, lacrimation, and rhinorrhea. Physical dependence is not a sign of addiction. It is an expected effect of chronic opioid use.

Addiction is a psychiatric condition characterized by loss of control of opioid use and excessive preoccupation with use of the drug for its psychic effect. Addiction often is associated with aberrant and destructive behavior that results in negative legal, social, and economic consequences. It is rare in patients who use opioids chronically for pain management.5,34

The patient who makes frequent requests for pain medication, “watches the clock,” or hoards medications may be experiencing uncontrolled pain or fear of uncontrolled pain. Such pseudo-addictive behaviors may resolve if adequate analgesia is made available to the patient.5,34

Opioid Side Effects

Constipation, nausea, sedation and respiratory depression, neuropsychological changes such as impaired cognitive function and slowed reactions, and urinary retention are common opioid side effects. With the exception of constipation, these side effects usually attenuate as tolerance develops. Side effects are managed by allowing tolerance to develop, changing opioid doses or schedules, switching to another opioid (opioid rotation), or adding specific therapies to manage the side effects.

Constipation is a persistent problem whenever opioids are used regularly. Tolerance does not develop. Untreated opioid-induced constipation can lead to impaction and ileus that can be clinically difficult to distinguish from obstruction. Prophylactic daily use of stool softeners and mild laxatives given in scheduled doses is needed to avoid opioid-induced constipation. The use of stool softeners alone or bulk-forming laxatives is not recommended. Intractable opioid-induced constipation may be treated with naloxone given orally.

Nausea often is a problem in opioid-naive patients. Use of prophylactic antiemetics is helpful until tolerance develops, which usually occurs within 1 to 2 weeks. If nausea and vomiting are severe or persistent, opioid rotation may be helpful.

Sedation and respiratory depression are the most feared consequences of opioid use. Respiratory depression is uncommon in opioid-tolerant patients and is always preceded by sedation. Respiratory depression will reverse over time if the opioid dosage is decreased and may respond to measures that support respiratory function: airway clearance, oxygen administration, physical stimulation. Naloxone, an opioid antagonist, may be needed if such measures fail to reverse the situation. However, if the patient has been taking regular opioid doses for more than a few days, the use of naloxone will precipitate withdrawal symptoms and reverse analgesia. To avoid this, incremental administration (1 ml of a mix of 0.4 mg naloxone in 10 ml normal saline every 30–60 seconds) carefully titrated to reverse the respiratory depression is recommended for chronic opioid users.2,6,11

Sedation usually is seen in opioid-naive patients in whom it may be a harbinger of respiratory depression. For most patients, sedation resolves with development of tolerance. It may recur if the opioid is changed or doses are increased. Persistent sedation with chronic opioid use may respond to administration of psychostimulant medications such as methylphenidate (Ritalin, Novartis Pharmaceuticals Corp., East Hanover, NJ) or dextroamphetamine (Dexedrine, SmithKline Beecham, Philadelphia, PA). These psychostimulants also may improve the analgesic effect of the opioid.20

Like sedation and nausea, neuropsychological changes and urinary retention are most common in the opioid-naive patient. Tolerance to these effects may develop but opioid rotation may be necessary.

Irritability, myoclonus (spasmodic muscle contraction and relaxation), and seizures have been associated with accumulation of metabolites of meperidine, morphine, and hydromorphone. Patients with renal impairment are at highest risk. Dose reduction or opiate rotation is the recommended intervention.
**Adjuvant Analgesics**

Neuropathic pain may respond best to adjuvant medications such as tricyclic antidepressants or anticonvulsants. Amitriptyline (Elavil, AstraZeneca, Wilmington, DE), nortriptyline (Pamelor, Novartis), and desipramine are tricyclic antidepressants commonly used in neuropathic pain management. The analgesic effect may not be evident for several days. Although doses used in pain management are lower than those used to treat depression, sedation and anticholinergic side effects such as dry mouth, urinary retention, constipation, and delirium may occur, limiting usefulness for some patients.

Gabapentin (Neurontin, Parke Davis, Morris Plains, NJ) is an anticonvulsant widely used for treating neuropathic pain because of its effectiveness and favorable side effect profile. Titration to doses of 900 to 3600 mg a day may be necessary for maximal effectiveness but analgesic effect often is evident in 2 to 3 days. Phenytoin (Dilantin, Parke Davis), carbamazepine (Tegretol, Novartis), baclofen (Lioresal, Novartis) and clonazepam also are used.

**Table 7**

**Example of Equianalgesic Conversion**

Mr. M is on a continuous infusion of hydromorphone at 0.5 mg per hour. He requires no rescue doses for breakthrough pain. He is about to be discharged and wants to resume taking the long-acting morphine every 12 hours and oral morphine for breakthrough that he used at home.

1. Calculate the 24-hour dose of opioid being used.
   a. 24 hours × 0.5 mg hydromorphone = 12 mg/24 hours
2. Look up the equianalgesic doses of IV hydromorphone and oral morphine from the chart.
   a. Hydromorphone IV 1.5 mg = morphine PO 30 mg
3. Set up an equation to convert the doses.
   \[
   \frac{1.5 \text{ mg IV hydromorphone}}{30 \text{ mg PO morphine}} = \frac{12 \text{ mg IV hydromorphone}/24 \text{ hours}}{x \text{ mg PO morphine}/24 \text{ hours}}
   \]
   \[
   x = \frac{12 \text{ mg IV hydromorphone}/24 \text{ hours} \times 30 \text{ mg PO morphine}}{1.5 \text{ mg IV hydromorphone}}
   \]
   \[
   x = 240 \text{ mg PO morphine}/24 \text{ hours}
   \]
4. Establish actual dose of long-acting morphine every 12 hours by dividing the 24-hour dose by 2.
   \[
   \frac{240 \text{ mg PO morphine}/24 \text{ hours}}{2} = \text{Long-acting morphine } 120 \text{ mg PO every 12 hours}
   \]
5. Establish breakthrough dose of morphine (10–15% of 24-hour dose of long-acting opioid)
   a. Establish breakthrough dose: 240 mg PO morphine/24 hours × 10–15% = 24–36 mg.
   b. Short-acting morphine tablets are 15 and 30 mg so round dose to 15–30 mg or use liquid morphine to give 25–35 mg every 3 hours as needed for pain.

**References**


**Summary**

Despite the array of effective options for pain control, many people continue to suffer pain. There are multiple reasons for this, including individual patient issues. However, the major cause of this suffering is the failure to assess for pain. Because pain is subjective, it is often invisible and easy to overlook. Joint Commission on Accreditation of Healthcare Organizations and pain management experts advocate making pain the fifth vital sign to ensure routine screening for pain. Once pain is recognized, nurses and other healthcare professionals who are knowledgeable about pain assessment and management can work with patients to establish individualized pain management plans. Such plans include treatment of the causes of pain when possible, optimal use of analgesics and adjuvant medications, and nonpharmacological and interventional approaches. This approach to pain management strives to relieve pain and optimize quality of life.


