Pain Management in Occupational Health

A Guide for Non-Narcotic Pain Relief

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ABSTRACT

Narcotic pain management is currently a topic of concern in the United States; the latest concerns are both legal and ethical. Narcotics are frequently prescribed medications that, when improperly used or supervised, can cause death. Legal concerns include prescribing narcotics without performing detailed health-related evaluations, not recognizing those seeking drugs for personal recreational use, and clients diverting drugs to others for financial gain. Injured workers need to have pain controlled and be mentally safe to perform their job duties. This article identifies types of pain, comorbidities, and alternative methods of pain management beyond narcotic therapy, as well as discusses guidelines used to initiate narcotic therapy when needed.

Opioids have been effective pharmaceuticals in pain management, and when used appropriately, they have a low rate of abuse (Manchikanti, Fellow, Ailinani, & Pampati, 2010). Manchikanti et al. (2010) indicated that the rate of abuse in clients who started opioid therapy following a legitimate acute injury that later required chronic treatment was less than 5%. Reluctance to prescribe opiates was commonplace in the 1980s. Beginning in the 1990s, a more liberal approach to opiate use began to manifest. Today, opiates are the second most commonly prescribed treatment for pain, after nonsteroidal anti-inflammatory drugs (NSAIDs) (Eriksen, Sjogren, Bruera, Ekholm, & Rasmussen, 2006). Coinciding with this increase in use, opiate abuse has become alarming in the United States. From 1997 to 2007, the milligrams prescribed per U.S. citizen rose 400%. Although most abusers are not clients, this increase in prescription frequency has also increased access by abusers. The National Survey on Drug Use and Health stated that 70% of addicts receive their initial medications from friends or family. Only 5% of addicts report receiving their first dose from a street dealing source (Manchikanti, Damron, McManus, & Barnhill, 2004).

Client education and avoidance of overprescribing may be key to eliminating the overuse of narcotics. The American College of Physicians/American Pain Society (ACP/APS) guidelines recommend "judicious" use of narcotics in pain treatment (Chou & Huffman, 2007), and providers may consider saving these treatments for clients who fail first-line therapy (Frymoyer & Cats-Baril, 1991; Jamison, Serraillier, & Michna, 2011). The American College of Occupational and Environmental Medicine (ACOEM, 2011) guidelines for the chronic use of opioids state that opioid analgesics are to be used as a last resort in occupational pain management, especially because

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The authors disclose that they have no significant financial interests in any product or class of products discussed directly or indirectly in this activity, including research support.

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Received: July 9, 2012; Accepted: November 5, 2012.

work restrictions may be needed for the worker on opioid therapy. Several guidelines, including ACP and APS, suggest using NSAIDs or acetaminophen as first-line treatment (Chou & Huffman, 2007). Additionally, the World Health Organization (WHO) uses a pain ladder in which non-opioid treatment is the initial therapy (WHO, 2012).

Nurse practitioners, who may not have authority to prescribe narcotics or other controlled medications, as well as other providers attempting to limit prescription of controlled medications have a significant role in appropriately initiating treatment for pain. This article was written for prescribing practitioners wishing to use a stepwise approach to pain management in the workplace. Information is provided regarding initial approach to treatment and non-narcotic pharmacological agents that may be prescribed, including first-line treatments such as NSAIDs and acetaminophen, tricyclic antidepressants, selective norepinephrine reuptake inhibitors, anti-neuropathic pain agents, and topical agents. Treatments for comorbidities such as depression and insomnia, muscle relaxants, and non-pharmacological treatments, including massage therapy and acupuncture for pain control, are also discussed. Finally, steps that must be taken to initiate opiate therapy in the occupational health setting in cases where the client is not responding effectively to first-line treatments are discussed.

ASSESSMENT OF PAIN

Prior to any treatment, a detailed health history and physical examination should be documented to determine locations, types, and causes of pain (Burgel, 2006; Institute for Clinical Systems Improvement [ICSI], 2011). It may be difficult to determine work-relatedness of pain; pain may be directly related to work, may be due to a preexisting condition exacerbated by work, or may not be related to work at all. Pain may be related to psychological and psychosocial factors, including depression and job dissatisfaction, so the provider should ask workers questions related to these factors. Diagnostic testing via x-ray, computed tomography, magnetic resonance imaging, and sensory testing should be completed as needed to further determine sources of pain (Burgel, 2006).

TYPES OF PAIN

Acute and chronic musculoskeletal sources of pain are commonly encountered in the workplace. If a client has had pain for less than 6 weeks, this may be considered acute; conversely, if pain lasts longer than 6 weeks, it may be considered chronic (Chou & Huffman, 2007).

Acute musculoskeletal pain may occur as a result of an acute injury, such as a laceration, strain, or sprain, or an exacerbation of a previous injury or condition. According to ICSI (2011) guidelines, chronic pain in general may be defined as "persistent pain, which can be either continuous or recurrent and of sufficient duration and intensity to adversely affect a patient's well-being, level of function, and quality of life" (p. 15). Pain that has persisted for more than 6 weeks may be chronic. Chronic musculoskeletal pain often occurs as a result of overuse injury, or may manifest itself as pain that persists for greater than 6 weeks after the origination of an acute injury (ICSI, 2011). Muscle spasms, occurring acutely or chronically, can be another source of pain that may be experienced by workers in the workplace (Baumann, Strickland, & Herndon, 2011).

Lower back pain, both acute and chronic, is a common problem in the workplace and in the general U.S. population. In a 1997 report, it was estimated that as many as 7.6% of U.S. adults had suffered an episode of acute low back pain within the past 3 months (Carey et al., 1996; Kent & Keating, 2005). Each year, 2% of the U.S. work force is compensated for back injuries (Andersson, 1999).

Inflammatory pain is a type of musculoskeletal pain, also known as nociceptive pain. With this type of pain, prostaglandins are delivered to and stimulate primary sensory nerves, which then send messages of pain to pathways of the spinal cord (ICSI, 2011).

Neuropathic pain is a result of nerve root damage or other dysfunction of the somatosensory system (ICSI, 2011). Although neuropathic pain may have a multitude of sources, a few characteristics are shared by different causes of neuropathic pain, including pain in a neuroanatomical area with sensory deficit, spontaneous ongoing pain, radiating pain, aftersensations, and abnormal sensations. The symptoms may be divided into both positive and negative types. Positive symptoms, such as allodynia, are primarily due to understimulated neurons that become hypersensitive and respond inappropriately to stimuli (Jensen & Finnerup, 2007). One example of neuropathic pain that may be seen in the workplace is pain caused by the use of vibrating hand tools, which may contribute to Raynaud's phenomenon (Cherniack, 2011). Neuropathic pain may also be experienced by diabetics as peripheral neuropathy, which may affect the ability to appropriately complete job tasks, depending on the job. Fibromyalgia is another example of neuropathic pain with a musculoskeletal presentation (Chou & Huffman, 2007).

Comorbidities, including depression, anxiety, or insomnia, may occur in clients dealing with pain. Clients with chronic pain are four times more likely to experience depression than those not experiencing pain (Chou & Huffman, 2007). Anxiety and insomnia may also be associated with pain and may require appropriate treatment.

SELECTION OF PHARMACOLOGICAL TREATMENTS

A recent study of more than 200,000 clients in the general population indicated that 76% of them may be classified as having pain with no structural or neurological deficit (Vogt et al., 2005). In this study, it was found that most of these cases resolved in 6 to 12 weeks. For such clients, opioid risk may outweigh benefit, suggesting that the majority of clients experiencing this type of pain may be treated optimally with non-opioid pharmacological agents due to the acute, short-lasting nature of their pain. This line of reasoning appears to be consistent with most prominent guidelines for pain, including ACP and APS guidelines. The goal of the occupational prescriber is threefold: control pain, reduce risk of abuse, and reduce both direct and indirect cost related to the injury.

NSAIDs

NSAIDs are available over the counter, allowing clients the ability to self-treat without a prescription. NSAIDs function by inhibiting the cyclooxygenase pathway, resulting in reduced production of prostaglandins and thromboxanes. These compounds act as inflammatory messengers, and their inhibition results in reduction of pain, fever, and inflammation. NSAIDs have been shown to be effective first-line treatment for chronic inflammatory pain (Chou & Huffman, 2007), and they have proved to be significantly more effective than placebo in reducing acute back pain (Roelofs, Deyo, Koes, Scholten, & van Tulder, 2008). NSAIDs are more effective in the treatment of acute lower back pain than acetaminophen (Davies, Maher, & Hancock, 2008; Hickey, 1982). No significant difference was found between treatment with NSAIDs versus treatment with narcotic agents in clients suffering from acute episodes of lower back pain (Bach & Holten, 2009). Positive results are also seen in clients with chronic back pain, without presence of sciatica, indicating that general nociceptive pain may be treated effectively with NSAIDs (Roelofs et al., 2008).

NSAID therapy is not without risk of adverse reaction. Adverse events include gastrointestinal ulcer, renal impairment, and cardiovascular effects. The selective Cox-2 inhibitor, celecoxib, has a reduced instance of gastrointestinal upset due to its selectivity; however, conflicting reports indicate that cardiovascular instances are increased in the Cox-2 inhibitor class of medication and the risks and benefits of this treatment should be considered on a client-by-client basis (Van Tulder, Koes, & Bouter, 1997). The longest trial, the Celecoxib Long-term Arthritis Safety Study (CLASS), lasted 52 weeks and showed no increases in hypertension, congestive heart failure, or myocardial infarction compared to placebo (Silverstein et al., 2000). In terms of efficacy within the class of NSAIDs, little difference was found between the available agents. No particular agent scored better than any other in the relief of lower back pain (Peterson et al., 2010). All agents have similar adverse event profiles, with the exception of naproxen, which may have a reduced instance of cardiovascular events (Peterson et al., 2010). This further emphasizes the need for thorough history and physical examination when initially assessing a client with pain.

Acetaminophen

If a client cannot take NSAIDs, acetaminophen becomes the agent of choice. Acetaminophen works by centrally increasing the pain threshold and reducing the activity of pyrogens. Acetaminophen does not reduce inflammation; thus, the use of acetaminophen alone may not be sufficient in all cases. The reduced side effect profile makes acetaminophen an attractive option for hypertensive clients and clients suffering from kidney disease. In terms of efficacy, in acute pain studies, no difference in reduction of pain between NSAIDs and acetaminophen was found (Innes, Croskerry, Worthington, Beveridge, & Jones, 1998). In cases involving chronic lower back pain, NSAIDs were superior in terms of efficacy over acetaminophen (Hickey, 1982).

The long-term safety of acetaminophen is greater than that of NSAIDs. However, hepatotoxicity is a concern with acetaminophen treatment. In clients with hepatic disease, it has been shown that acetaminophen is more likely to be transformed into a toxic metabolite known as N-acetyl-para-benzoquinoneimine (NAPQI) (Baumann et al., 2011; Benson, 1983), which may result in further hepatic damage. Evaluation of liver function is recommended prior to beginning a long-term treatment plan involving acetaminophen. Clients should be advised to take no more than 4 total grams of acetaminophen per day to reduce the risk of hepatic disease. Acetaminophen is often paired with opioid narcotics due to its ability to potentiate response to opioid analgesics. Should a client have pain severe enough that use of an opioid is warranted for quality of life, acetaminophen will continue to have a place in therapy (Clinical Pharmacology, 2012).

Tramadol

Tramadol may be the most potent Food and Drug Administration approved drug available for the treatment of moderate to severe pain. Acetaminophen may be used with tramadol to potentiate its effects (Clinical Pharmacology, 2012). Three-month randomized, controlled trials have demonstrated tramadol in combination with acetaminophen as being effective in lowering client-perceived pain via the Visual Analog Scale pain score, and being more highly rated as a "good or very good" drug by clients in an experimental group in the treatment of fibromyalgia (Perrot, Krause, Crozes, Naïm, & GRTF-ZAL-1 Study Group, 2006). One study of tramadol continued for 2 years with large samples. These studies indicated that tramadol was effective for long-term treatment of pain, although the addition of acetaminophen made no significant difference in overall pain reduction scores (Alwine, 2000). Tramadol may also be a useful agent when treating similar types of pain in an occupational setting.

Treatments for Neuropathic Pain

Although the agents listed above are useful treatment modalities for musculoskeletal pain, they are ineffective in the treatment of neuropathic pain. At least two agents have been shown to be effective in the treatment of neuropathic pain. The first is gabapentin, which reduces neuron excitability. A typical dose begins at 300 mg per day, titrating upward as needed to relieve pain to a total of 1,800 mg per day. Clients reported a reduction in neuropathic pain by one third on a 10-point pain scale when treated with gabapentin, a statistically significant result compared with placebo (Rowbotham, Harden, Stacey, Bernstein, & Magnus-Miller, 1998). Gabapentin may cause dizziness and should be used with caution in elderly clients.

Another agent effective in the treatment of neuropathic pain is venlafaxine. Venlafaxine is a serotonin norepinephrine reuptake inhibitor. In a double-blinded study, 197 clients with diabetic neuropathy were placed into a group receiving either placebo, 75 mg of extended release venlafaxine, or 150 to 225 mg of extended release venlafaxine (Rowbotham, Goli, Kunz, & Lei, 2004). After 4 to 5 weeks of treatment, the group receiving the high-

est dose of venlafaxine showed significant reductions in client-reported pain. Although venlafaxine is used off-label for this purpose, the data behind this application are well documented. Venlafaxine has several side effects, with the most common being nausea. Client history and examination are essential before initiating selective norepinephrine reuptake inhibitor therapy; venlafaxine has been shown to increase blood pressure, likely due to the norepinephrine component of the drug's mechanism of action (Feighner, 1995).

Although venlafaxine is not specifically indicated for fibromyalgia, neuropathic pain, or chronic musculoskeletal pain, another drug in the same class, Cymbalta®, is Food and Drug Administration approved for all of these indications. In terms of treatment of neuropathic pain, 21% more clients reported pain relief, compared to placebo, in a 12-week double-blinded study (Traynor, Thiessen, & Traynor, 2011). Typically, clients receive 60 mg of Cymbalta® for the treatment of neuropathic pain. Doses for fibromyalgia and chronic musculoskeletal pain typically start at 30 mg and increase to 60 mg as needed. Several clinical trials have shown the efficacy of Cymbalta® in the treatment of musculoskeletal pain. Both clinicians and clients showed a significant reduction in pain and severity of illness with Cymbalta® therapy in these 3- to 6-month clinical trials (Traynor et al., 2011). No benefit has been formally demonstrated beyond 12 weeks in the treatment of chronic musculoskeletal pain.

Cymbalta® is a brand name medication. The side effect profile appears to be favorable when compared to venlafaxine. Client history and financial means must be taken into consideration, along with clinician judgment, to weigh the risks and benefits associated with Cymbalta® for each patient. Thus, choosing a selective norepinephrine reuptake inhibitor requires the clinician to account for several variables.

Proposed mechanisms for the treatment of neuropathic pain include sodium channel regulation and histamine modulation (Coluzzi & Mattia, 2005). Amitriptyline and nortriptyline, two tricyclic antidepressants, have shown usefulness in several crossover studies with injury populations including postherpetic neuralgia (Watson, Gilron, & Sawynok, 2010) and painful polyneuropathy (Gomez-Perez et al., 1985).

Muscle Relaxants

Many muscle relaxants are not controlled substances and may be helpful in reducing muscle spasticity. Some examples include baclofen and cyclobenzaprine. Baclofen is Food and Drug Administration approved for the treatment of spasticity and spinal cord injury. Dosing requires careful titration to avoid adverse reactions. Conversely, abrupt cessation may result in rebound spasticity as well as seizure. For these reasons, client education and compliance are key to achieving optimal therapy. Baclofen is useful in the reduction of nociceptive back pain, but does little for the treatment of neuropathic pain (Teasell et al., 2010). Additionally, after 3 months, baclofen begins to lose effectiveness and should be titrated downward. Baclofen may be used orally, but may also be used in an intrathecal pump for the management of intractable pain, something the occupational health nurse practitioner should consider as a client may need referral for unresolved muscle spasms.

Cyclobenzaprine has been shown to reduce pain in clients suffering from back pain or spinal injury. Randomized, controlled trials indicate a significant reduction in self-reported pain among clients undergoing therapy (Landy, Altman, & Xie, 2011). The most common side effect from this medication is somnolence, although this effect is seen less frequently in clients taking the extended release formulation (Landy et al., 2011). Evidence suggests that oral muscle relaxants used beyond short-term therapy are less beneficial over time (Meier et al., 2003).

Topical Agents

The occupational health nurse practitioner may also prescribe several topical agents for pain relief. Topical NSAIDs show pain relief similar to that of oral NSAIDs without the risk of gastrointestinal complications. Many overall responses are high, with a 50% to 60% reduction in perceived pain on average. Most prescription topical NSAIDs, such as Voltaren® gel, may be cost prohibitive for some clients. Occupational health nurse practitioners should weigh the benefits versus the risks for clients who may use topical NSAIDs by evaluating gastrointestinal history and financial means.

Lidocaine patches are useful in alleviating neuropathic hypersensitivity, as shown in a randomized, controlled trial in which clients self-reported pain improvement (Meier et al., 2003). Few side effects with lidocaine patches were identified; however, mild skin irritation may occur.

Capsaicin has a unique mechanism in alleviating neuropathic pain. Application may be painful and uncomfortable; however, long-term use has been shown to deplete Substance P from the surrounding tissue, resulting in reduction of perceived pain (Sindrup & Jensen, 1999). Capsaicin may be useful in certain client populations but may not be as effective as other topical anesthetics. As high as a 30% reduction in pain has been reported with long-term topical capsaicin, indicating that this form of therapy may be useful in certain populations (Webster, Peppin, Murphy, Tobias, & Vanhove, 2012).

Antidepressant, Anti-anxiety, and Anti-insomnia Agents

The occupational health nurse practitioner may help alleviate issues of depression, anxiety, and insomnia if the client requires intervention. Several agents that can reduce symptoms of depression also have implication for pain management, such as tricyclic antidepressants and the previously mentioned selective norepinephrine reuptake inhibitors. In terms of insomnia, several non-controlled agents may be used, including hydroxyzine, diphenhydramine, and tramadol.

Tricyclic antidepressants, which as previously mentioned have a neuropathic pain indication, include amitriptyline and nortriptyline. These medications are inexpensive and can serve the dual purpose of controlling symptoms of both depression and neuropathic pain (Vogt

et al., 2005). Unfortunately, tricyclic antidepressants have several side effects, particularly anticholinergic side effects, which result in providers avoiding tricyclic antidepressants as first-line treatment for depression; however, these agents may be viable in certain populations (Clinical Pharmacology, 2012).

As mentioned previously, selective norepinephrine reuptake inhibitors can treat neuropathic pain as well as depression and anxiety. These medications may be useful for clients with these comorbidities.

For clients suffering from insomnia, several agents are available for sleep, including antihistamine agents such as hydroxyzine and diphenhydramine. These agents act subcortically to induce sedation (Clinical Pharmacology, 2012). Although hydroxyzine has indications for both anxiety and sleep induction, diphenhydramine does not. As both are relatively inexpensive options, the occupational health nurse practitioner may consider hydroxyzine as the better of these two options. First-generation histamine blockers are known to have anticholinergic side effects and should be used with caution for clients with hypertension, asthma, chronic obstructive pulmonary disease, and benign prostatic hypertrophy (Clinical Pharmacology, 2012). Trazadone, taken at bedtime, induces sleep due to histamine and adrenergic blockage. This agent has fewer anticholinergic effects, although large doses (e.g., as high as 300 mg) may be occasionally needed for sleep (Clinical Pharmacology, 2012).

NON-PHARMACOLOGICAL TREATMENTS

Non-pharmacological treatments such as acupuncture and massage therapy have been shown to be effective in the management of chronic back pain. A meta-analysis of acupuncture clinical trials indicated that immediately following treatment, clients suffering from chronic lower back pain reported relief (Madsen, Gotzsche, & Asbjorn, 2009). How long this relief persists was not discussed. Additionally, acupuncture is an adjunct, not an alternative, to treatment. Spinal manipulation has some limited success in both acute and chronic cases of back injury (Assendelft, Morton, Yu, Suttorp, & Shekelle, 2003). Massage has also been reviewed as therapy and found to be effective yet inferior to other modes of treatment (Furlan, Brosseau, Imamura, & Irvin, 2002). The cost-effectiveness of these therapies has not been reviewed and they should not be considered first-line therapy according to ACP and APS guidelines (Chou & Huffman, 2007).

WHEN OPIOID TREATMENT IS NECESSARY

ACOEM (2011) clinical guidelines provide a rigid set of criteria for initiation and management of clients with chronic pain requiring opioid therapy. A medical diagnosis that would normally be considered to cause pain, such as a fracture, must exist. Limitation of everyday activities must be reduced; pain may be considered alleviated if limitation is not present. Individuals must demonstrate resistance to first-line treatments. Through psychological evaluation, clients must not demonstrate psychological potential for substance abuse or report a history of substance abuse. Referral for expert psychological or pain management consultation should be made as needed. Careful monitoring of clients engaged in opioid therapy and restrictions for work should be arranged (ACOEM, 2011).

In occupational pain management, communication with clients is critical. Clients must realize the goal of pain management is to provide them a means to continue work and life activities with minimal pain and maximal physical function. Clients will often have the expectation of being completely pain free as a result of treatment. By discussing expectations and relaying realistic goals of treatment, needless changes in pain medication or increases in doses may be avoided (Baumann et al., 2011). The first-line pharmacological agents available for pain are recommended as the standard for care in both the workplace and the community. Following a stepwise approach to pain management allows the occupational health nurse practitioner to appropriately manage pain.

SUMMARY

This article suggests that the occupational health nurse practitioner and other occupational health providers approach both acute and chronic pain in the workplace with a multidimensional strategy for pain management. In many states, occupational health nurse practitioners have controlled substance prescriptive authority and can include narcotic therapy when necessary. Pain management standards of practice suggest that opiate therapy is best used when all first-line therapies have failed.

IN SUMMARY

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Workplace Health & Safety, 60(12), 525-530.

1. Client education and avoidance of overprescribing may be key to eliminating the overuse of narcotics.
2. The goal of the occupational prescriber is threefold: control pain, reduce risk of abuse, and reduce both direct and indirect costs related to injury.
3. Following a stepwise approach to pain management allows the provider to appropriately manage pain.
4. American College of Occupational and Environmental Medicine clinical guidelines provide a rigid set of criteria for initiation and management of clients with chronic pain requiring opioid therapy.

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