The Economic Impact of Opioid Use in the Management of Chronic Nonmalignant Pain

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SUMMARY

Chronic nonmalignant pain (CNMP), defined as persistent pain that is not attributable to a potentially life-limiting condition and has a duration of at least 3 months, is widespread in the United States. Moderate-to-severe CNMP often is treated with opioid analgesics, and there is ongoing debate regarding appropriate allocation of opioids to treat CNMP because long-term treatment can result in problematic side effects, drug misuse, or abuse leading to detrimental medical, social, and economic consequences. Furthermore, therapeutic strategies arising from concerns about the misuse of opioids may impede the treatment of patients who require strong analgesics for adequate pain relief. While current CNMP management includes nonpharmacologic and pharmacologic approaches, including acetaminophen, nonsteroidal anti-inflammatory drugs, and opioids, there is debate regarding the risk-benefit profile of opioids for chronic pain treatment.

Mitigation of opioid misuse and abuse and proper administration of opioid analgesics must be balanced against providing appropriate analgesia. To accomplish this, managed care policies could implement guidelines that focus on evaluating risk characteristics for opioid misuse and abuse, use opioid dose-sparing strategies, and encourage the use of alternative analgesics or nonpharmacologic therapy when appropriate. The purpose of this review is to examine challenges and costs associated with CNMP management using opioids and to summarize alternative therapeutic approaches.

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As the world population ages, the health care systems must increasingly consider long-term management of conditions affecting an older population, including chronic pain, which is defined as pain that persists longer than would be expected for resolution of the underlying etiology (often defined as pain lasting more than 6 or 12 weeks).[1,2] A 2010 survey of adults in the United States found that greater than 35% of respondents aged 45 years or older reported experiencing chronic pain, 89% of which reported pain lasting more than a year, reflecting the status of chronic pain as a major public health concern.[3] Chronic nonmalignant pain (CNMP) is defined as pain secondary to trauma, nonlife-limiting disease, or unidentified causes.[4] It is unclear whether CNMP as a clinical entity necessitates the use of therapeutic strategies unique from other forms of chronic pain. For example, the U.S. Food and Drug Administration (FDA) has stated that there is no evidence to suggest that CNMP should be treated with different pharmacotherapies than cancer-related pain, but they have restricted the use of some analgesics to patients with persistent cancer pain.[5]

Chronic pain affected approximately 100 million people in the United States in 2011 and was associated with economic consequences ranging from $560 billion to $635 billion annually in medical care and decreased productivity, underscoring the need for more effective pain management strategies.[6,7] Opioids are some of the most commonly prescribed drugs to treat moderate-to-severe chronic pain, and their use in CNMP has steadily increased despite uncertainty regarding their long-term efficacy and related safety and economic concerns.[8-12] The Consortium to Study Opioid Risks and Trends (CONSORT) study, which examined opioid use in the United States using pooled insurance data comprising greater than 1% of the U.S. population, found the prevalence of long-term opioid use—defined as more than 120 days of dispensed medication for CNMP—to be between 3.9% and 4.7%.[13] While drug diversion (intentional removal of opioids from legitimate distribution and dispensing channels) and abuse (nonmedical use of opioids to achieve psychotropic effects, e.g., euphoria) have occurred concurrently with the increases in opioid prescriptions, some patients still receive inadequate pain control, and there are other concerns surrounding opioid use for CNMP.[14-18] Other potential problems with long-term opioid use for chronic pain include questions of cost-effectiveness, which compares the costs and outcomes based on the likelihood of positive and negative consequences; side effects associated with long-term use; whether these patients are receiving adequate analgesia; and quality-of-life improvements.[19-21]

A goal of managed care is to provide employers with a package of health care benefits that are affordable and meet the health care needs of employees.[22,23] Thus, a detailed examination of current practice patterns in chronic pain management, patient responses to therapy, and nonopioid analgesic use may identify areas that could be targeted for improvement. The purpose of this commentary is to discuss challenges and costs associated with CNMP management using opioids and alternative approaches to treatment.

Characteristics and Prevalence of Opioid Use Disorder and Other Adverse Effects of Opioid Use

In the United States, opioid use disorder, which is defined by a series of behaviors in the *Diagnostic and Statistical Manual of Mental Disorders,* 5th edition, that include tolerance, dependence, and continued use despite adverse consequences,[24] can be associated with misuse (opioid use that does not

follow medical indications or prescribed dosing) and diversion, which is becoming increasingly common.[14,24-26] At the same time, many patients who would benefit from opioid pharmacotherapy are denied these drugs due to prescribers' fear of regulatory sanctions if patients intentionally or unintentionally harm themselves.[6] Some studies suggest that few chronic pain patients develop opioid use disorder, but estimates of the number of patients who develop opioid use disorder have been inconsistent.[20] Often, such trials do not evaluate opioid dependence or addiction, and the topic of addiction specifically in chronic pain patients has received little attention, even as the number of opioid prescriptions has increased.[27,28] Roland et al. (2013) have reported that the overall prevalence of opioid abuse in the United States managed care population doubled from 2005 to 2010, with an overall prevalence during the study period of 0.195%.[29] This marked increase in the number of opioid prescriptions since the early 2000s underscores the importance of investigating the safety and efficacy of current therapeutic strategies.[23] Results from the 2013 National Survey on Drug Use and Health indicate that approximately 4.8% of people aged 12 years or older reported nonmedical use of analgesics during the previous year.[30] Consistent with these findings, nonmedical use of analgesics is the second most common form of illicit drug abuse in the United States (17.3%) after marijuana (61.8%).[31]

The potential for abuse is not the only risk associated with opioid use for chronic pain. Opioid use is associated with a number of side effects (Table 1), and a 2005 meta-analysis found that approximately 1 in 5 chronic pain patients experienced side effects including constipation, dry mouth, dizziness, and nausea that led to their withdrawal from clinical trials less than 1 month in duration.[32] Longer-term use also carries risk of conditions such as opioid-induced hyperalgesia (increased sensitivity to pain), which was thought to be a symptom of withdrawal but now has been recognized during continuous opioid use.[33] A small observational study found that opioid-using CNMP patients exhibited significantly greater pain scores when administered a cold-pressor test.[34] Another study of chronic pain patients found that opioid use was associated with significantly higher pain and unpleasantness scores when patients received an injection, and the increase in pain scores correlated with opioid dose and duration of use.[35] Thus, care providers can face additional challenges in providing adequate analgesia for opioid-using patients who are also experiencing acute pain or who require treatment for painful clinical procedures.[36] Opioid use for treatment of chronic pain has also been identified as a risk factor for central sleep apnea and hypoxemia in small studies, affecting up to 30% of opioid users.[37-39] Opioid-induced sleep apnea has also been identified as a potential cause of opioid-related mortality.[40] Psychosocial disorders may also affect CNMP patients using opioids; a survey using the Prescribed Opioids Difficulties Scale (PODS), which asks patients to rate concerns and difficulties on a scale from "strongly agree" to "strongly disagree," found that, while high PODS scores were not correlated with patients' pain intensity, they correlated strongly with depression symptoms, concerns over dependence on opioids, and opioid-related problems with concentration or arousal.[41]

Opioid use disorder and unintentional overdose resulting from prescribed opioids are serious potential consequences of opioid treatment for CNMP. The extent of opioid use disorder, particularly in patients with legitimate prescriptions for chronic pain, can be difficult to estimate. A 2008 meta-analysis

TABLE 1 Adverse Events Associated with Chronic Opioid Use[25,96-99]

Central Nervous System
Cognitive impairment
Delirium
Depression
Disordered sleep
Myoclonus
Sedation
Somnolence
Respiratory System
Apnea
Ataxic breathing
Central sleep apnea
Hypercapnia
Hypoxia
Obstructive sleep apnea
Respiratory arrest and death
Respiratory depression
Cardiovascular System
Bradycardia
Cardiovascular event risk
Orthostatic hypotension
Vasodilatation
Gastrointestinal System
Abdominal cramping
Abdominal distention
Constipation
Delayed gastric emptying
Gastric reflux
Intestinal antisecretory activity
Nausea/vomiting
Endocrine System
Decreased androstendedione
Decreased dehydroepiandosterone sulfate
Decreased libido
Decreased testosterone
Early menopause
Sexual dysfunction
Testicular atrophy
Immune System
Altered cytokine production
Increased histamine release
Increased HIV replication
Inhibition of macrophage and natural killer cell activity and recruitment
Pruritus
Reduced wound healing

that investigated studies of addiction and aberrant drug-related behaviors in CNMP patients found that, while the overall percentage of patients considered to be addicted was 3.27%, it was 0.19% in studies that included only patients with no history of alcohol or illicit drug abuse or addiction, suggesting that the risk of addiction is low in most patients.[42] Another review of studies that investigated the prevalence of "problem use" in CNMP patients, which included an array of behaviors from addiction to misuse, found that the prevalence of "problem use" varied widely, from 0%-50% of CNMP patients.[26] A 2011 study of more than 2,300 chronic pain patients found that the lifetime prevalence of opioid use disorder was 34.9%, with risk factors including age less than 65 years, history of substance abuse, antisocial personality disorder, and a prescription for psychotropic drugs.[43] These studies suggest that, while opioid use disorder among CNMP patients may be difficult to estimate, risk factors such as a history of substance abuse have a large impact on whether a patient will exhibit characteristics of opioid use disorder. Accidental overdose of opioid medications is also a concern when prescribing opioids for CNMP. CONSORT data used to investigate opioid overdose among CNMP patients showed that patients receiving an opioid dose of 100 milligrams (mg) or more had a 1.8% annual overdose rate—8.9 times that of patients receiving 20 mg or less per day.[44] A large study of overdose deaths among West Virginia residents—93.2% of which were related to opioid analgesics—found that 36.9% of decedents had documented prescriptions for the medications resulting in fatal overdose.[45] These results suggest that a substantial proportion of opioid overdoses are not due to diversion. A panel of experts examining opioid-related deaths that occurred over a decade identified a variety of potential factors involved in overdose cases, including undiagnosed comorbidities, physician error, patient nonadherence, and use of other drugs such as benzodiazepines. A disproportionately high number of deaths were attributed to methadone compared with the number of prescriptions, possibly due to the different pharmacokinetics of methadone compared with morphine.[40] Overdose rates reflect unintentional misuse of prescribed opioids as well as use of diverted opioids, which are commonly used for pain relief.[26] Since the rates of diversion and nonmedical use of prescription analgesics are increasing in the United States with detrimental consequences, including overdose, the costs to public health of opioid use disorder and overdose must be weighed against the importance of adequate treatment of chronic pain.[46]

The Economic Impact of Opioid Misuse

The economic consequences of opioid misuse, whether resulting from opioid diversion, opioid use disorder, or poor treatment adherence, are substantial.[16,47-49] The Centers for Disease Control and Prevention have noted that deaths from overdoses of opioid analgesics were responsible for nearly 40% of deaths from poisoning in 2006, making it the second leading cause of injury death among 34-54 year olds.[50] White et al. (2005) used an administrative database of pharmacy claims to determine mean annual health care costs of opioid abusers from the perspective of a private payer.[51] White et al. reported that the mean annual direct health care costs for opioid abusers were more than 8 times higher than those for nonabusers from a private payer perspective ($15,884 to $18,388 vs. $1,830 to $2,210, respectively).[51] In that study, drug costs were found to be more than 5 times higher in opioid abusers compared with nonabusers ($2,034 vs. $386, respectively).[51] In addition, the performed multivariate regression analysis that controlled for comorbidities showed that average health care costs for opioid abuse are approximately 1.8 times higher than those for depression, a common comorbidity in chronic pain patients.[16,51] In 2007, prescription opioid abuse cost $55.7 billion, which included $25 billion in health care costs, $25.6 billion in workplace costs, and $5.1 billion in criminal justice costs.[48] The majority of the associated health care costs resulted from medical and prescription expenses ($23.7 billion).[48]

An analysis of 8,954 malpractice claims collected from 2005 to 2008 by Fitzgibbon et al. (2010) showed that the vast majority (94%) of medication management claims were related to patients being prescribed opioids for management of chronic pain.[52] Stratification of the analyzed population by factors typically associated with the misuse of medication, including a history of depression and aberrant behavior (e.g., concurrent use of illicit drugs and escalating dosages) revealed that 80% of patients had at least 1 factor typically associated with medication misuse, and 24% had at least 3 factors. The majority of claims (82%) consisted of patients who were uncooperative with respect to care (69%) or clinicians who managed medications inappropriately (59%). Among the medication malpractice claims evaluated, death was the most common outcome (57% vs. 9% in other chronic pain claims). Long-acting opioid and additional psychoactive medication use and the presence of at least 3 risks for medication misuse were associated with increased mortality rates in opioid users. Twenty-four percent of these patients reported addiction to prescribed opioids; however, the term *addiction* was not defined in the study.[52] McAdam-Marx et al. (2010) reported that, in a Medicaid population with an opioid abuse prevalence of 8.7 cases per 1,000, patient costs were significantly higher in opioid abusers than in age- , gender- , and state of residence-matched controls.[53] Furthermore, as with any type of substance abuse, people who abuse opioids are more likely to incur severe injuries as a result of their abuse that require multiple treatments, which are likely to escalate costs.[54] Unintentional overdose also increases patient costs, whether it is due to opioid use disorder or to unintentional misuse. A 2009 report of the total cost of prescription opioid poisoning in the United States estimated the direct costs at $1.76 billion annually, with indirect costs estimated to be $13.9 billion annually.[55]

The extensive health care and societal costs reported for opioid abuse and misuse underscore the need for efforts to alleviate this burden. However, it is important that these efforts do not hinder patient access, especially in an era where pain is often poorly managed.[16] Furthermore, these statistics should be assessed cautiously. Patients receiving opioid therapy frequently suffer from severe pain and have an increased morbidity.[46] Although opioid use increases health care costs,[53-55] it is unclear whether reductions in opioid prescription rates would decrease costs because of the significant nonopioid-related financial burden associated with disease processes for which opioids are prescribed.

Patients with health insurance coverage are more likely to have their prescriptions filled than patients who lack insurance, likely due to the lower cost of the drug to the patient and an increased number of physician visits.[23] In addition, the type of insurance coverage often dictates which opioids are prescribed based on the costs to the payer.[18] Long-term opioid therapy may cause adverse outcomes (Table 1) that can increase treatment and drug costs and produce adverse social consequences. Costs include those associated with mismanagement of the drug due to misconceptions regarding opioids, as well as criminal justice and workplace costs.[7,48,49,53] Thus, a focus on the proper allocation of opioids to patients for whom they are indicated as well as on reducing improper use may lower health care costs and improve patient quality of life.

Alternatives to Opioid Use

In order to provide alternatives and attempt to reduce the risk of misuse in CNMP patients, there is an increasing emphasis on the use of nonopioid analgesics and multimodal therapeutic regimens.[56] Mild-to-moderate CNMP is often managed with oral nonopioids, such as acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs), which are not associated with the development of drug dependence, although opioids are indicated if pain is sufficiently severe.[57] Acetaminophen is effective in the management of a variety of pain conditions and is a first-line therapy for knee and hip osteoarthritis when clear inflammation is not present.[58-61] However, acetaminophen is not innocuous; acute overdose of the drug may cause fatty liver damage.[62] NSAIDs have gained widespread use in the management of chronic pain in the past half century; however, NSAIDs are associated with dose-related gastrointestinal, cardiovascular, and renal adverse events (AEs) that can occur at any point following treatment, and these AEs can increase health care costs.[57-60,63-65] All NSAIDs, including nonprescription and cyclooxygenase (COX)-2 selective agents, have been associated with an approximately 1.5-fold increase in the risk of vascular events.[66] Evans et al. (1995) reported that the risk of hospital admission for acute renal failure was approximately double for NSAID users compared with NSAID-naïve patients.[67] The gastrointestinal, cardiovascular, and renal AE risks associated with NSAIDs are reduced with lower doses and less frequent use.[66] As a consequence, various investigative and new technologies and modes of drug delivery have been developed with a focus on lessening the risk of AEs by avoiding absorption via the gastrointestinal tract (topical preparations) and/or permitting the delivery of drugs with low systemic exposure but with equivalent efficacy compared with standard formulations (submicron particle formulations).[68,69] In addition, use of opioids and NSAIDs concurrently is mutually dose sparing, thus reducing the potential for AEs and associated costs with both drug classes.[70-74] This dose-sparing effect allows patients who require opioid therapy to use lower doses of NSAIDs and opioids, providing good pain relief and lowering the risk of complications associated with either drug.

Adjunctive analgesic therapy may be effective in CNMP. Analgesic adjuncts used to treat CNMP include anticonvulsants, antidepressants, and short courses of muscle relaxants, among others.[75-85] Several anticonvulsant agents are useful in neuropathic pain and fibromyalgia and may be cost-effective alternatives to opioids (Table 2).[75-77] Gabapentin and pregabalin have been shown to reduce health care costs in patients with painful axial radiculopathy, diabetic neuropathy, and postherpetic neuralgia.[78,79] In a meta-analysis considering the likelihood of pain relief alongside the burden and cost of side effects, Cepeda and Farrar (2006) reported that carbamazepine is more cost-effective than tramadol and gabapentin for the treatment of neuropathic pain in patients lacking renal or cardiovascular disease ($50, $98, and $270 per patient per month, respectively).[80] Tricyclic antidepressants are drugs of choice in neuropathic pain, according to the International Association for the Study of Pain.[81] The selective serotonin reuptake inhibitors may lessen pain perception by improving depressed mood but are not analgesics, per se. The serotonin-norepinephrine reuptake inhibitor duloxetine was approved by the FDA for the management of neuropathic and some types of nociceptive pain.[77,80,82-85] In a subset of patients with painful diabetic neuropathy who completed a 52-week clinical trial, Wu et al. (2006) determined that, from employer and societal perspectives, duloxetine was more cost-effective than gabapentin (56%), venlafaxine (36%), and amitriptyline (15%).[85] From the payer perspective, there was a trend toward increased cost-effectiveness of duloxetine compared with the standard therapy.[85] In a cost-utility analysis that estimated the cost per amount of utility gained for several neuropathic pain therapies, the tricyclic antidepressant amitriptyline was shown to be more cost-effective than tramadol and gabapentin for neuropathic pain in patients without renal or cardiovascular disease.[80] Although amitriptyline and other tertiary end-chain tricyclic antidepressants are associated with serious AEs related to their anticholinergic activity, the secondary end-chain agents, most notably desipramine, are associated with far less anticholinergic and sedative side effects—one-quarter for desipramine and one-half for nortriptyline compared with amitriptyline.[86]

TABLE 2 Average Monthly Cost Comparison of Analgesic Drugs[100-103]

Generic Name	Brand Name[a]	Frequency of Use Per Day	Total Daily Dose[b]	Average Monthly Cost ($)[c]
Long-acting opioids				
Hydromorphone pills	Exalgo	1	8 mg	349
			12 mg	520
			16 mg	738
Methadone pills	Generic	3	15 mg	17
			30 mg	20
Morphine pills	Generic	2	30 mg	48
	Avinza	1	30 mg	177
	Kadian	1	30 mg	247
	MS-Contin	2	60 mg	270
	Avinza	1	60 mg	313
	Kadian	1	60 mg	433
	Generic	2	120 mg	101
	Avinza	1	90 mg	456
	Kadian	1	100 mg	692
Oxymorphone pills	Opana ER	2	20 mg	290
	Opana ER	2	30 mg	343
	Generic	2	30 mg	319
	Opana ER	2	40 mg	509
	Opana ER	2	80 mg	955
Oxycodone pills	OxyContin	2	20 mg	164
	OxyContin	2	40 mg	306
	OxyContin	2	80 mg	529
	OxyContin	2	160 mg	1,031
Opioid patches				
Buprenorphine patches				
5 mcg/h	Butrans	0.3	120 mcg	189
10 mcg/h	Butrans	0.3	240 mcg	276
20 mcg/h	Butrans	0.3	480 mcg	495
Fentanyl extended-release patches				
25 mcg/h	Duragesic	0.3	600 mcg	303
25 mcg/h	Generic	0.3	600 mcg	126
50 mcg/h	Duragesic	0.3	1,200 mcg	666
50 mcg/h	Generic	0.3	1,200 mcg	205
Nonsteroidal anti-inflammatory drugs[d]				
Celecoxib capsule	Celebrex	2	200 mg	219
	Celebrex	1	200 mg	181
	Celebrex	1	400 mg	282
Diclofenac capsule	Zipsor	4	100 mg	412
Diclofenac tablet	Generic	3	150 mg	46
Ibuprofen tablet	Advil	6	1,200 mg	18
	Motrin	6	1,200 mg	21
	Generic	6	1,200 mg	11
Indomethacin capsule	Generic	3	75 mg	21
	Generic	2	100 mg	35
Meloxicam tablet	Mobic	1	7.5 mg	187
	Generic	1	7.5 mg	95
Naproxen tablet	Aleve	3	660 mg	13
	Generic	3	660 mg	10
	Generic	2	1,100 mg	39
Naproxen extended-release tablet	Naprelan	1	750 mg	307
Piroxicam	Generic	1	10 mg	71
	Generic	1	20 mg	126
Anticonvulsants[e]				
Carbamazepine	Generic	3	600 mg	19
Gabapentin	Neurontin	3	300 mg	99
	Generic	3	300 mg	33

[a]*Selected doses among those available.*
[b]*For opioids, total daily dose of opioids only.*
[c]*For opioids, prices reflect nationwide retail average for July 2012, rounded to the nearest dollar.*
[d]*For nonsteroidal anti-inflammatory drugs, monthly cost reflects national average retail prices for March 2013, rounded to the nearest dollar; data were provided by Source Healthcare Analytics, Inc.*
[e]*For anticonvulsants, prices are based on nationwide retail average prices for April 2011.*
mcg/h = microgram per hour; mg = milligram.

Muscle relaxants have demonstrated efficacy in musculoskeletal pain management when used for short durations (4-7 days).[87] Short courses of muscle relaxants may be a useful adjunct therapy to analgesics when administered intermittently for durations not exceeding 1 week; however, this combination is associated with an elevation of central nervous system AEs and should be used with caution.[87] Overall, the integration of multimodal therapy is an important aspect of individualized patient care, and effective individualized therapy may reduce health care costs by improving patient quality of life and minimizing AEs.

Nonpharmacologic interventions, such as exercise, physical therapy, and psychotherapy that are aimed at self-management can be effective adjuncts to pharmacotherapy, and such multimodal approaches can reduce overall costs of care and reduce the amount of opioid-containing medications used.[8] These interventions have been found to alleviate pain in some chronic pain patients, including those with low back pain or osteoarthritis, the 2 most common conditions that result in CNMP in the United States.[3,8] Acupuncture has shown modest benefits for pain from osteoarthritis.[88] A meta-analysis of a few studies found that use of braces and therapeutic insoles may provide small benefits for knee osteoarthritis.[89] For low back pain, transcutaneous electroconvulsive therapy has shown efficacy in some patients, and meta-analyses have shown that massage, behavioral modification, and exercise show modest benefits.[90-93] However, many of the studies are small, and the costs of these therapies compared with conventional treatments has not been thoroughly assessed.

Alternative beneficial strategies to reduce the rate of opioid use disorder and their associated costs are interdisciplinary comprehensive pain programs (CPP), in which clinicians with expertise in pain management work to provide multimodal pain treatment, whereby dose and treatment are individualized with the goal of functional restoration. A 2006 review of CPP found that enrolled patients returned to work sooner than non-CPP patients and estimated that CPP may result in a lifetime health care savings of up to $400,000 per patient.[19] A study investigating outcomes in CPP patients found that patients enrolled in a CPP showed significantly better outcomes in a number of categories, including pain severity, interference in daily activities, distress, and ability to rest.[94] Careful monitoring of dose may also limit the potential for development of opioid use disorder, since a nonescalating dose may be key in preventing addiction and other negative consequences of opioid use for chronic pain.[95] These results suggest that improvements in patient management may improve outcomes and reduce costs over time, despite the initial costs of establishing interdisciplinary pain clinics.[19]

Conclusions

Opioid use in chronic pain patients has increased over the last decade with a concurrent increase in opioid misuse and opioid use disorder, which have significantly impacted rising health care costs and public health. Opioid misuse costs the health care system billions of dollars annually; opioid prescriptions for CNMP result in thousands of malpractice claims each year; and detrimental side effects of opioid use for CNMP can result in suboptimal patient care. However, many CNMP patients have benefitted greatly from opioid therapy for moderate-to-severe chronic pain. The 2012 FDA-mandated Risk Evaluation and Mitigation Strategy for extended-release and long-acting opioids requires pharmaceutical companies to provide patients with medication guides and to educate clinicians on patient counseling; selection; and assessment of the risk for patient misuse, dependency, and addiction. Additional strategies that could be adopted include opioid dose-sparing strategies, including use of NSAIDs and adjunctive therapies such as anticonvulsants, antidepressants, and muscle relaxants, as well as nonpharmacologic interventions. Furthermore, implementation of comprehensive pain programs may decrease costs while improving outcomes for CNMP patients.

The aforementioned multimodal approaches should be recognized by the medical community with the goal of facilitating appropriate drug use and minimizing drug diversion and misuse. Moreover, the implementation of such strategies may improve patient care by providing effective pain relief to patients with CNMP who require these drugs. Taken together, cost-effective strategies designed to incorporate alternative therapies along with more appropriate management of opioid use should decrease the prevalence of opioid abuse (overuse/underuse), while also ensuring that future CNMP patients who require opioid therapy receive adequate pain relief.

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DISCLOSURES

Lipman has no conflicts to disclose. Webster is a consultant to AstraZeneca, Cara Therapeutics, CVS Caremark, Mallinckrodt Pharmaceuticals, Marathon Pharmaceuticals, Merck, and Zogenix. He is a participant in advisory boards for Charleston Labs, Collegium Pharmaceuticals, Egalet, Inspirion Pharmaceuticals, Kaleo, Orexo, Pfizer, Signature Therapeutics, and Trevena. He is a participant in advisory boards and a consultant to Insys Therapeutics and Proove Biosciences.

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