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Is it time US dentistry ended its opioid dependence?

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Abstract

Background.—In 2017, 11.4 million US citizens misused prescription opioids, resulting in 46 overdose deaths daily and a $78.5 billion burden on the economy. Dentists are one of the most frequent prescribers of opioids, and there is concern that dental prescribing is contributing to the opioid crisis.

Methods.—A 2019 study showed 22.3% of US dental prescriptions were for opioids compared with 0.6% of dental prescriptions in England where nonsteroidal anti-inflammatory drugs (NSAIDs) and acetaminophen accounted for most analgesic prescriptions. This observation prompted a review of international analgesic prescribing habits and of the advantages and disadvantages of opioids and NSAIDs for treating dental pain.

Results.—US opioid prescribing far exceeded that in other countries where NSAIDs accounted for most dental analgesic prescribing. Furthermore, results from reviews published respectively in 2018 and 2016 help confirm that NSAIDs and NSAID-acetaminophen combinations are as effective as or more effective than opioids for controlling dental pain and cause significantly fewer adverse effects.

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Conclusions.—In light of the potential for misuse and evidence that NSAIDs are as effective as opioids and have fewer adverse effects, there is clear patient benefit in avoiding opioids for the prevention or management of dental pain.

Practical Implications.—A growing preponderance of evidence shows that opioids are not needed for routine oral health care. This article provides an overview of the evidence and outlines possible pain management models to minimize opioid use in dentistry. The purpose is to stimulate debate about this important topic and encourage the development of definitive guidance by professional bodies, health care providers, and state and federal agencies.

Keywords

Odontogenic pain; postoperative analgesia; dental; opioid; nonsteroidal anti-inflammatory drugs; acetaminophen; analgesic; opioid crisis; guidelines

The US Department of Health and Human Services declared the opioid crisis a public health emergency in October 2017.[1] The crisis has its roots in the 1990s when pharmaceutical companies convinced the medical community that patients would not become addicted to newer opioid pain relievers, such as oxycodone. The initial perceived safety of newer opioids, coupled with quality metrics emphasizing aggressive pain control, fueled a 4-fold increase in opioid sales from 1999 through 2010.[2] Increased prescribing of opioids led to widespread misuse of both prescription and nonprescription opioids before it became clear that these medications could be highly addictive.

The Centers for Disease Control and Prevention (CDC) quantifies the devastation caused by the massive increase in opioid prescriptions in the United States. The most recent data from 2017 show estimates that 11.4 million people misused prescription opioids and 46 died each day from overdoses involving these drugs.[3,4] This number accounts for nearly one-third of the more than 130 deaths per day from all types of opioid-related overdose (illicit and prescription).[5] The economic burden of prescription opioid misuse in the United States was an estimated $78.5 billion for calendar year 2013.[6] Opioid misuse is associated with an overall decrease in US life expectancy,[7,8] and prescription opioiderelated overdose deaths were 5 times higher in 2017 than in 1999.[3]

The prescription opioid crisis is focused on the United States, which consumes 80% of the global opioid supply despite being only 5% of the world's population.[9,10] Globally, prescription opioids are among the most commonly misused and abused medicines. In the United States, Canada, and to a lesser extent Australia and New Zealand, illicit use of prescription opioids outpaces that of heroin, which produces a similar high and poses similar health risks, including death.[11,12]

DENTISTRY'S ROLE

Dentists account for 8.6% of all opioid prescribing, which is just behind pain medicine physicians (8.9%) but significantly less than family physicians (20.5%) and internal medicine physicians (15.7%).[13–16] Although overall opioid prescribing has decreased by 27.5% nationally from 2012 through 2017,[13,17,18] in part due to the introduction of

prescription drug monitoring programs (PDMPs),[19] dental prescribing rates have decreased by only 2.2% over the same period.[13,17,20] Dentists are the leading source of opioids for children and adolescents aged 10 through 19 years.[16] In 2009, dentists accounted for 31% of opioid prescriptions in this age group, and, from 2010 through 2015, the largest increase in dental opioid prescriptions was among 11- through 18-year-olds.[16] Evidence published in 2019 suggests that dental exposure to opioids in adolescents and young adults who are opioid naive is associated with higher rates of opioid use between 3 months and a year later compared with results in control participants.[21] Even more troubling, adolescents and young adults prescribed opioids by dentists were more likely to have subsequent diagnoses associated with opioid abuse or overdose.

Study results also have shown that dentists prescribe opioids in greater quantities, at higher strength, and for longer periods than are necessary to control dental pain.[14,22–25] In part, this overprescribing may be because dentists tend to overestimate the pain associated with dental procedures.[26] In addition, dentists often prescribe opioid pain relief “just in case” or “to be taken as needed.”[14] As a result, more than one-half of opioids prescribed after tooth extraction remain unused.[27] These unused medications could release large numbers of opioid pills to be diverted to other purposes,[27] with the potential for opioid abuse and dependence.[21,28,29]

The main source of prescription drugs diverted to nonmedical use is family members or friends who give or share their prescription medication to help a friend or family member in physical distress or pain.[14] Such use is illegal and a significant factor in facilitating opioid abuse.[30–32] In other cases, those already addicted or those involved in the illegal supply of opioids, may “shop around” for sources of prescription opioids and falsify or exaggerate their pain to access opioids. Dentists have been identified as among those prescribers whom substance abusers most commonly target when “doctor shopping” to obtain multiple prescriptions of controlled substances, including opioids.[14,18,25]

The opioid most frequently prescribed by dentists is hydrocodone, followed by codeine, oxycodone, and tramadol, respectively.[25] Hydrocodone is approximately equivalent to morphine in potency, whereas oxycodone is 1.5 times more powerful than morphine. In comparison, tramadol and codeine are approximately one-tenth the potency of morphine.[33] Hydrocodone and oxycodone are among the drugs most commonly associated with drug dependency and overdose deaths.[34] Dentists also prescribe higher-potency and longer-acting opioids, agents at high risk of being abused and diverted.[25]

HOW DOES US DENTISTRY COMPARE?

In a 2019 study, the authors compared opioid prescribing by dentists in the United States and in England.[25] In the United States, 22.3% of all dental prescriptions were for opioids compared with 0.6% of English dental prescriptions. At the patient level, this equated to 35.4 prescriptions per 1,000 US population (95% confidence interval [CI], 25.2 to 48.7) compared with 0.5 per 1,000 English population (95% CI, 0.03 to 3.7). At the provider level, this equated to 58.2 prescriptions per US oral health care provider (95% CI, 44.9 to 75.0) compared with 1.2 prescriptions per English oral health care provider (95% CI, 0.2 to 5.6).

Furthermore, the only opioid dentists in England prescribed was dihydrocodeine, a semisynthetic opioid with approximately one-fifth the potency of morphine.[33] Most analgesic prescriptions by dentists in England were for nonsteroidal anti-inflammatory drugs (NSAIDs) or paracetamol (acetaminophen), and this pattern of prescribing is similar throughout the United Kingdom.

These differences in opioid prescribing are huge and exist despite similar patterns of dental office visits by children and adults; no difference in oral health quality indicators, including untreated caries and edentulousness; and no evidence of significant differences in the patterns of dental disease or treatment between the 2 countries or any evidence that dental patients experience more pain in the United Kingdom as a result of these differences.[25,35–38] Although there are greater educational and income-related health inequalities in the United States, the overall oral health of US and UK citizens is similar.[25,35–38] These patterns of dental analgesic prescribing, however, are not unique to the United Kingdom and are replicated in many countries outside of the United States and Canada. Results from numerous studies show no or low opioid prescribing by dentists in much of Europe,[25,39–41] Asia,[42–44] and Africa.[45] As is the case in the United Kingdom, ibuprofen and other NSAIDs are by far the most frequently prescribed analgesics in these countries. Although there is significant opioid prescribing in Australia, it is almost entirely confined to prescribing of the combined paracetamol (acetaminophen) and 30-milligram codeine preparation.[46]

THE ROOTS OF THE PROBLEM

Before the 1990s, opioid use was restricted largely to cancer pain relief, terminal care, and short-term management of severe traumatic injuries or visceral pain. Most clinicians were concerned about the addiction risk and therefore were reluctant to prescribe opioids for chronic or noncancer-related pain.

In the late 1990s, study investigators focused on patient quality of life found that one-third of the US population were affected by chronic pain. In response, organizations like The Joint Commission pushed for increasing attention to pain assessment and treatment, referring to pain as the “fifth vital sign.”[47] The concept that all patients should be screened for pain led to treatment of pain being raised to a “patients’ rights” issue.[47] During this time, reports appeared in the medical literature claiming that opioids were not addictive, even when used for chronic noncancer pain.[47–49] These findings opened the window for pharmaceutical companies to expand from the relatively small cancer pain and traumatic injury markets into the much larger chronic pain market. Some opioid manufacturers used seductive high-pressure marketing and invited clinicians to all-expenses-paid pain management conferences.[49] The purported lack of addictive potential was promoted heavily, with sales representatives falsely reporting to clinicians that the addiction potential was “less than one percent.”[49] Even the initial US Food and Drug Administration approval for OxyContin in 1996 stated that addiction was “very rare.”[47,49] Clinicians also began prescribing opioids for acute pain. Furthermore, the idea that pain management was a patient right led to a culture in which patients expected to be able to demand opioids for pain relief, and clinicians, including dentists, felt it was in their patients’ best interests to prescribe them. This perfect

storm of conditions made opioid prescribing for pain the norm in the United States, but the same conditions did not exist to the same degree in other countries.

WHY DID THESE PROBLEMS NOT EVOLVE ELSEWHERE?

There are several reasons why these conditions were not replicated outside the United States. For example, many other countries have strict regulations governing the use of advertising, entertainment, and other inducements to persuade clinicians to prescribe particular drugs or make unevidenced claims about them. Many countries also have national guidelines on managing dental pain and formularies or regulations that limit the prescribing of drugs by dentists. In addition, health care policy stakeholders in other countries did not engage in the misconstrued effort to combat chronic pain aggressively with oral prescription opioids.

EVIDENCE FOR THE EFFICACY OF DIFFERENT DENTAL ANALGESICS

Analgesic prescribing in dentistry occurs largely in 2 situations. The first is to provide relief from odontogenic pain (for example, pulpitis, apical infection, localized osteitis, or pericoronitis). The second is for pain control after invasive dental procedures (for example, dental extractions).

Odontogenic pain is mainly inflammatory in origin, caused by the interaction of microbial pathogens with host tissues to cause an acute inflammatory response. The most appropriate response is to drain any abscesses, treat infection that may have spread, reduce inflammation, and achieve definitive cause control by using restorative, endodontic, or oral surgical procedures. When analgesia is required, a medication with anti-inflammatory properties is the most logical choice because it will have the dual effect of reducing inflammation while relieving pain. Investigators in few studies specifically looked at the use of different analgesics for relieving acute odontogenic pain. However, investigators in a 2015 study showed that one-third of opioid prescriptions to beneficiaries receiving Medicaid were issued in association with noninvasive oral health care visits and that the mean duration of opioid prescription was significantly higher than for invasive procedure—related visits, which is concerning because it suggests the possibility that patients are being offered opioids instead of definitive treatment of their odontogenic pain.[50] Similarly, nontraumatic dental pain accounted for 2.18 million emergency department visits in 2012, nearly 2% of the total, and 50.3% of these patients received an opioid prescription compared with just 14.8% of all other patients in the emergency department.[51] Patients who sought care at the emergency department with nontraumatic dental pain were twice as likely to receive an opioid than a nonopioid or no pain medication.[51] Furthermore, most prescriptions were to keep the patient going until the patient could receive definitive dental treatment, a situation commonly associated with higher dose and longer duration of prescription and with opioid abuse and diversion.

Investigators have studied the management of pain relief in association with invasive dental procedures much more extensively, largely because of the ease of use and predictability of the third-molar extraction model for clinical trials. In 2018, at the request of the American Dental Association Council on Dental Practice, Moore and colleagues[52] performed an

overview of systematic reviews of analgesic medications used in the management of acute dental pain. In this review, they concluded that NSAIDs, either alone or in combination with acetaminophen, were equal or superior to opioid-containing medications for relief of postoperative dental pain. Furthermore, opioid medication and opioid medication combinations were associated with higher rates of acute adverse events. Investigators in another systematic review of the management of pain related to endodontic procedures also concluded that "NSAIDs should be considered as the drugs of choice to alleviate or minimize pain of endodontic origin … ."[53] In settings in which NSAIDs alone are ineffective, the authors recommended using "… an NSAID with acetaminophen or a centrally acting drug … ."[53]

HOW CAN WE REDUCE DENTISTRY'S DEPENDENCY ON OPIOID ANALGESICS?

Given this evidence, action is required to reduce opioid prescribing in dentistry. How, then, can this be achieved? Widely accepted pain management guidelines are essential. The American Dental Association's 2016 statement on the use of opioids in the treatment of dental pain provides the following anodyne recommendation: "Dentists should consider nonsteroidal anti-inflammatory analgesics as the first-line therapy for acute pain management."[54] Similarly, the CDC recommendations focus on the management of long-term pain with opioids and say little about their use for acute pain management.[55]

The National Academy of Medicine recommends that dentists use nonopioid analgesics for postprocedural pain and counsel patients about the risks and benefits of opioids, evaluate the risk of experiencing opioid abuse, and use PDMPs before prescribing opioids.[56] In a 2019 survey, however, the investigators found that nearly one-half of dentists reported having never accessed a PDMP, most often due to lack of awareness; mandated use was associated with the highest access of PDMPs, and most dentists found them helpful.[57]

Achieving the goal of reducing opioid prescribing in dentistry also would be aided by the use of formularies or regulations that limit the prescribing of drugs by dentists, which occurs in countries such as the United Kingdom. Restrictions on the use of some drugs by US dentists may be an unpopular solution, but dentists in the United Kingdom have not felt limited in their professional capacity by the Dental Practitioners' Formulary (which is part of the British National Formulary) that defines the nature, dose, and duration of drugs that dentists can prescribe. Such restriction, along with national prescribing guidelines, makes discussions with patients who expect or demand opioids much easier because both patients and dentists know the limits of what constitutes professional and legal prescribing. Such changes may require action by state regulators and state boards or prescription benefit insurers and organizations.

The advice on short-term use of opioids in the CDC guidelines suggest it would not be unreasonable to limit opioid prescribing by dentists to a 3-day supply of immediate-release opioids and limit the dose to a maximum of 50 morphine milligram equivalents (MMEs) per day.[55] This limit is supported by findings from a 2018 study that indicated that the median duration of opioid supply by dentists was 3 days and the median daily dose was 33.3 MMEs,

suggesting that many dental opioid prescriptions are within these limits.[58] However, in the same study, the mean (standard deviation) number of days' supply was 4.82 (5.92) and the mean (standard deviation) daily dose MMEs was 43.05 (68.71), suggesting that a significant number of dental opioid prescriptions also exceed these limits.[58] Other unsafe opioid prescribing practices that investigators have identified and that could be avoided by the use of PDMPs, include repeat and overlapping opioid prescriptions.[24,58] Data published in 2019 suggest that some dentists also issue prescriptions for agents at high potential for misuse (for example, oxycodone and long-acting opioids) that have no place in the management of dental pain.[25]

MANAGING ODONTOGENIC AND POSTOPERATIVE PAIN IN GENERAL DENTAL PRACTICE

How, then, should dental pain be managed? To address this issue, we have drawn on the findings of the reviews cited earlier,[52,53] the advice of the American Dental Association,[54,59] CDC,[55] National Academy of Medicine recommendations,[56] and UK guidelines.[60,61]

In the case of odontogenic pain, most authorities agree that it is essential that dentists prioritize identifying and treating the cause of the pain. In cases in which an abscess exists, drainage should be performed by means of endodontic treatment, surgical incision and drainage, or extraction of the tooth, depending on what is most appropriate. Clinicians should treat other causes of dental pain with appropriate restorative or other oral health care. In cases in which there is spreading infection or pyrexia, the clinician should prescribe appropriate antibiotic treatment and, if appropriate, consider a referral to specialist oral surgical care.[60]

When pain is mild to moderate, study results suggest that management with 400 mg of ibuprofen 4 times daily for 5 days (preferably after food) provides effective analgesia.[52,53,60,61] For moderate to severe pain, study results suggest that 400 mg of ibuprofen plus 1,000 mg of acetaminophen 4 times daily for 5 days (preferably after food) provide pain relief as effective as, if not more effective than, pain relief provided by opioids.[52,53,60,61] These doses are for adults and should be amended as appropriate in children and adolescents. The UK guidelines also recommend the same analgesic strategies for short-term pain relief, pending definitive treatment of the cause, which should not be delayed more than 24 through 72 hours.[60,61] The US guidelines also recommend these strategies for postoperative pain management (for example, after third-molar surgery)[52,53] when they recommend beginning analgesia before the local anesthesia wears off to optimize pain relief.

NSAIDs such as ibuprofen are contraindicated in those with a history of active or previous peptic ulcer or in those with a history of hypersensitivity to aspirin or other NSAIDs, including those in whom NSAIDs have precipitated attacks of asthma, angioedema, urticaria, or rhinitis. Clinicians also should exercise caution about the use of NSAIDs in older adults, pregnant women, breast-feeding mothers, those taking oral anticoagulants such as warfarin, and those with coagulation defects, inherited bleeding disorders, or renal impairment.[60,61] In such situations, the recommendation is prescribing 1,000 mg of acetaminophen 4 times daily for 5 days or using another alternative to NSAIDs.[52,53,60,61]

In those with previous or active peptic ulcers in whom acetaminophen alone will provide insufficient analgesia, the recommendation is prescribing ibuprofen or diclofenac in conjunction with a proton pump inhibitor (for example, 15 mg of lansoprazole or 20 mg of omeprazole once daily for the duration of the NSAID treatment).[61]

Clinicians should advise patients that they should not exceed the prescribed dose and that the aim of the analgesia is to make them as comfortable as possible, although some discomfort is normal and still may occur.[52] After an operative procedure, as the patient's discomfort improves, the patient should feel free to reduce and stop the medication as he or she feels able.

The evidence makes a compelling case in favor of the use of NSAIDs with or without acetaminophen for all types of dental pain, except when NSAIDs are contraindicated, and they should be used as first-line therapy for acute pain management.[52–54,56,59] Furthermore, clinicians should discuss this information with any patient requesting an opioid for dental pain relief.[56] However, when an opioid is considered necessary, the recommendation is that the clinician properly evaluate patients for suitability, prior opioid use, and the potential for misuse or diversion of supplies.[56,59] To facilitate this practice, dentists should consult the PDMP each time they prescribe an opioid.[57,59]

When clinicians prescribe opioids for acute pain, they should prescribe the lowest effective dose of immediate-release opioids for the shortest anticipated duration.[55] The CDC recommends writing opioid prescriptions for 3 days' duration or less.[55] If pain extends beyond this time, NSAIDs or acetaminophen should be sufficient to manage any residual discomfort. The lowest effective dose should not exceed a maximum of 50 MMEs per day (morphine MME = 1, hydrocodone MME = 1, oxycodone MME = 1.5, codeine MME = 0.15; therefore, a maximum of 50 mg hydrocodone per day, 30 mg of oxycodone per day, or 75 mg of codeine per day).[55]

CONCLUSIONS

In light of evidence showing that NSAIDs are at least as effective as opioids in the management of odontogenic and dental postoperative pain and cause significantly fewer adverse effects, there is clear patient benefit in moving away from opioids in the management of these conditions. When this information is put alongside the opioid crisis, the case for taking action now to end US dentistry's opioid dependence becomes compelling.

ABBREVIATION KEY

CDC	Centers for Disease Control and Prevention
MME	Morphine milligram equivalent
NSAID	Nonsteroidal anti-inflammatory drug
PDMP	Prescription drug monitoring program

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