Is it Time US Dentistry Ended its Opioid Dependence?

Brief Title – Opioids in Dentistry

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Structured 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 recent study showed 22.3% of US dental prescriptions were for opioids compared to 0.6% 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 the vast majority of dental analgesic prescribing. Furthermore, recent reviews confirm NSAIDs, and NSAID-acetaminophen combinations are as or more effective than opioids for controlling dental pain and cause significantly fewer side-effects.

Conclusions.

In light of the potential for misuse, and evidence that NSAIDs are as effective as opioids and have fewer side 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 dental 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

on this important topic and encourage the development of definitive guidance by professional bodies, health providers, and state and federal agencies.

Keywords:
Odontogenic Pain, Post-operative analgesia, Dental, Opioid, NSAID, Acetaminophen, Analgesic, Opioid Crisis, Guidelines.

Abbreviations:

American Dental Association – ADA
Centers for Disease Control and Prevention – CDC
Emergency department - ED
Food and Drugs Administration – FDA
National Academy of Medicine - NAM
National Health Service – NHS
Non-steroidal anti-inflammatory drugs - NSAIDs
Prescription Drug Monitoring Programs – PDMP
United Kingdom – U.K.
United States – U.S.

The Problem

The U.S. 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 rise in opioid sales between 1999 and 2010.[2] Increased prescribing of opioids led to widespread misuse of both prescription and non-prescription opioids before it became clear that these medications could indeed be highly addictive.

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

The prescription opioid crisis is very much focused on the U.S., which consumes 80% of the global opioid supply despite representing only 5% of the world's population.[9, 10] Globally, prescription opioids are among the most commonly misused and abused medicines. In the U.S., 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. This is just behind pain medicine physicians (8.9%) but significantly less than family (20.5%) and internal medicine (15.7%).[13-16] While overall opioid prescribing has decreased by 27.5% nationally between 2012 and 2017,[13, 17, 18] in part due to the introduction of Prescription Drug Monitoring Programs (PDMP),[19] dental prescribing rates have fallen by only 2.2% over the same period.[13, 17, 20] Perhaps most worrysome, dentists are the leading source of opioids for children and adolescents aged 10 to 19.[16] In 2009, dentists accounted for 31% of opioid prescriptions in this age group and, between 2010 and 2015, the largest increase in dental opioid prescriptions was among 11 to 18-year-olds.[16] Recent evidence suggests that dental exposure to opioids in opioid-naïve adolescents and young adults is associated with higher rates of opioid use between 3 months and a year later compared to controls. Even more troubling, adolescents and young adults prescribed opioids by dentists were more likely to have subsequent diagnoses associated with opioid abuse or overdose.[21]

Studies have also 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 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 half of opioids prescribed following tooth extraction remain unused.[27] This 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 non-medical use are 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 in order to access opioids. Dentists have been identified as among those prescribers that 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, while oxycodone is 1.5 times more powerful than morphine. In comparison, tramadol and codeine are approximately 1/10th the potency of morphine.[33] Unsurprisingly, hydrocodone and oxycodone are among the drugs most commonly associated with drug dependency and overdose deaths.[34] Higher-potency and longer-acting opioids, agents at high risk for abuse and diversion, are also prescribed by dentists.[25]

How Does U.S. Dentistry Compare?

A study recently published in JAMA Network Open,[25] compared opioid prescribing by dentists in the United States and England. In the U.S. 22.3% of all dental prescriptions were for opioids compared to 0.6% of English dental prescriptions. At the patient level, this equated to 35.4 prescriptions /1000 of the U.S. population (95%CI: 25.2-48.7) compared with 0.5/1000 of the English population (95%CI: 0.03-3.7). At the provider level, this equated to 58.2 prescriptions per U.S. dental provider (95%CI: 44.9-75.0) compared with 1.2 prescriptions per English dental provider (95%CI: 0.2-5.6). Furthermore, the only opioid prescribed by dentists in England was di-hydrocodeine a semi-synthetic opioid with about 1/5th the potency of morphine.[33] The vast majority of analgesic prescriptions by dentists in England were for non-steroidal anti-inflammatory drugs (NSAIDs) or paracetamol (acetaminophen) and this pattern of prescribing is similar throughout the United Kingdom (U.K.).

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 dental caries and edentulousness, and no evidence of significant differences in the patterns of dental disease or treatment between the two countries nor any evidence that dental patients suffer more pain in the UK as a result of these differences.[25, 35-38] Although there are greater educational and income related health inequalities in the U.S., the overall oral health of U.S. and U.K. citizens is very similar.[25, 35-38] These patterns of dental analgesic prescribing, however, are not unique to the U.K. and are replicated in many countries outside of North America. Numerous studies show no or very low opioid prescribing by dentists in much of Europe,[25, 39-41] Asia[42-44] and Africa.[45] As is the case in the U.K., 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 codeine 30mg preparation.[46]

The Roots of the Problem

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

In the late 1990's studies focused on patient quality of life revealed that a third of the U.S. 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 non-cancer

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. The purported lack of addictive potential was heavily promoted, with sales representatives falsely reporting to clinicians that the addiction potential was "less than one percent."[49] Even the initial FDA approval for OxyContin in 1996 stated that addiction was "very rare." Clinicians also began prescribing opioids for acute pain. Furthermore, the idea that pain management was a patient right, led to a culture where patients expected to be able to demand opioids for pain relief and clinicians, including dentists, felt it was in their patient's best interests to prescribe them. This perfect storm of conditions made opioid prescribing for pain the norm in the U.S. but the same conditions didn't exist to the same degree in other countries.

Why didn't these problems evolve elsewhere?

There are several reasons why these conditions were not replicated outside the U.S. 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. Additionally, healthcare policy stakeholders in other countries also did not engage in the misconstrued effort to aggressively combat chronic pain with oral prescription opioids.

Evidence for the Efficacy of Different Dental Analgesics

Analgesic prescribing in dentistry occurs largely in two situations (i) to provide relief from odontogenic pain e.g. pulpitis, apical infection, localised osteitis or pericoronitis, or (ii) for pain control following invasive dental procedures e.g. 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 using restorative, endodontic, or oral surgical procedures. When analgesia is required, a medication with anti-inflammatory properties is the most logical choice, as it will have the dual effect of reducing inflammation while relieving pain. There are few studies specifically looking at the use of different analgesics for relieving acute odontogenic pain. However, a recent study showed that one third of opioid prescriptions to Medicaid beneficiaries were issued in association with non-invasive dental visits and the mean duration of opioid prescription was significantly higher than for invasive procedure related visits. This is concerning, since it suggests the possibility that patients are being offered opioids instead of definitive treatment of their odontogenic pain.[50] Similarly, non-traumatic dental pain accounted for 2.18 million emergency department (ED) visits in 2012, nearly 2% of the total, and 50.3% of them received an opioid prescription compared to just 14.8% of all other ED patients. Indeed, patients who presented to the ED with non-traumatic dental pain were twice as likely to receive an opioid than a non-opioid or no pain medication.[51] Furthermore, most prescriptions were to 'keep the patient going' until they could receive definitive dental treatment, a situation commonly associated with higher dose and longer duration of prescription and with opioid abuse and diversion.

Management of pain relief in association with invasive dental procedures has been much more extensively studied, largely because of the ease of use and predictability of the third molar extraction model for clinical trials. Recently, Moore et al performed an overview of systematic reviews of analgesic medications used in the management of acute dental pain at the request of the American Dental Association (ADA) Council on Dental Practice.[52] This review concluded that NSAIDs, either alone or in combination with acetaminophen, were equal or superior to

opioid-containing medications for relief of post-operative dental pain. Furthermore, opioid medication and opioid medication combinations were associated with higher rates of acute adverse events.[52] Another systematic review of the management of endodontic procedure related pain, also concluded that "NSAIDs should be considered as the drugs of choice to alleviate or minimize pain of endodontic origin." In settings where 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 ADA'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 on their use for acute pain management.[55]

The National Academy of Medicine (NAM) recommends that dentists use non-opioid analgesics for post-procedural pain and counsel patients about the risks and benefits of opioids, evaluate the risk of opioid abuse and utilize PDMPs prior to prescribing opioids.[56] A recent survey, however, found that nearly half of dentists reported having never accessed a PDMP, most often because of lack of awareness. Mandated use was associated with the highest access of PDMP and most dentists found them very helpful.[57]

Achieving the goal of reducing opioid prescribing in dentistry would also be aided by the use of formularies or regulations that limit the prescribing of drugs by dentists as occurs in countries such as the UK. Restrictions on the use of some drugs by U.S. dentists may be an

unpopular solution, but dentists in the UK 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 can be prescribed by dentists. Indeed, such restriction, along with national prescribing guidelines, makes discussions with patients who expect or demand opioids much easier, since 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 and/or prescription benefit insurers and organisations. The advice on short-term use of opioids in the recent CDC Guidelines suggest it would not be unreasonable to limit opioid prescribing by dentists to three-day's supply of immediate-release opioids and limit the dose to a maximum of 50 morphine milligram equivalents (MME) per day.[55] This is supported by a recent study that found that the median duration of opioid supply by dentists was 3 days and the median daily dose was 33.3 MME, suggesting that many dental opioid prescriptions are within these limits. However, in the same study, the mean number of days supply was 4.82 (SD +/- 5.92) and the mean daily dose 43.05 MME (SD +/- 68.71) suggesting that a significant number of dental opioid prescriptions also exceed these limits.[58] Other unsafe opioid prescribing practices that have been identified, and could be avoided by the use of PDMP, include repeat and overlapping opioid prescriptions.[24, 58] Recently published data suggests that some dentists also issue prescriptions for agents at high potential for misuse (e.g, oxycodone, long-acting opioids) that have no place in the management of dental pain.[25]

Managing Odontogenic and Post-Operative Pain in General Dental Practice

How then should dental pain be managed? To address this, we have drawn on the findings of the reviews cited above,[52, 53] the advice of the ADA,[54, 59] CDC,[55] NAM recommendations,[56] and current UK guidelines.[60, 61]

In the case of odontogenic pain, most authorities agree that it is essential that dentists prioritise identifying and treating the cause of the pain. Where an abscess exists, drainage should be obtained by endodontic treatment, surgical incision and drainage, or extraction of the tooth depending on what is most appropriate. Other causes of dental pain should be treated with appropriate restorative or other dental care. Where there is spreading infection or pyrexia, appropriate antibiotic treatment should be started, and, if appropriate, referral to specialist oral surgical care considered.[60]

Where pain is mild to moderate, recent studies suggest management with ibuprofen 400mg four times daily, for 5 days (preferably after food) provides effective analgesia.[52, 53, 60, 61] For moderate to severe pain, recent studies suggest ibuprofen 400mg plus acetaminophen 1000mg four times daily for 5 days (preferably after food) provide as effective, if not more effective pain relief than opioids.[52, 53, 60, 61] These doses are for adults and should be amended as appropriate in children and adolescents. The same analgesic strategies are also recommended for short term pain relief, pending definitive treatment of the cause, which should not be delayed more than 24-72 hours.[60, 61] They are also recommended for post-operative pain management e.g. following third molar surgery,[52, 53] when it is recommended that analgesia is commenced before the local anaesthesia wears off in order to optimise pain relief.

NSAIDs such as ibuprofen are contraindicated in those with a history active or previous peptic ulcer or in those with a history of hypersensitivity to aspirin or other NSAIDs, including those in whom attacks of asthma, angioedema, urticaria or rhinitis have been precipitated by NSAIDs. Caution should also be exercised about the use of NSAIDs in the elderly, pregnant women, nursing mother, those taking oral anticoagulants such as warfarin, those with coagulation defects, inherited bleeding disorders or renal impairment.[60, 61] In such situations, it

is recommended that acetaminophen 1000mg, is prescribed four times daily for 5 days, or another alternative to NSAIDs is used. [52, 53, 60, 61]

In those with previous or active peptic ulcers, where acetaminophen alone will provide insufficient analgesia, it has been recommended that ibuprofen or diclofenac could be prescribed in conjunction with a proton pump inhibitor e.g. lansoprazole 15mg or omeprazole 20mg once daily for the duration of the NSAID treatment.[61]

Patients should be advised not to exceed the prescribed dose and that the aim of the analgesia is to make them as comfortable as possible, but some discomfort is normal and still may occur.[52] Following an operative procedure, as the patient's discomfort improves, they should feel free to reduce and stop their medication as they feel able.

Current evidence makes a compelling case in favour of the use of NSAIDs with or without acetaminophen for all types of dental pain except where NSAID are contraindicated and should be used as first-line therapy for acute pain management.[52-54, 56, 59] And this information should be discussed with any patient requesting an opioid for dental pain relief.[56] However, when an opioid is considered necessary, it is recommended that patients are properly evaluated for suitability, prior opioid use and the potential for misuse or diversion of supplies.[56, 59] To facilitate this, dentists should consult the PDMP each time an opioid is prescribed.[57, 59] When opioids are used for acute pain, clinicians should prescribe the lowest effective dose of immediate-release opioids for the shortest anticipated duration.[55] The CDC recommends writing opioids prescriptions for 3 days duration or less.[55] If pain extends beyond this, NSAIDs or acetaminophen should be sufficient to manage any residual discomfort. The lowest effective dose should not exceed a maximum of 50 morphine milligram equivalents (MME)/day (morphine MME = 1, hydrocodone MME = 1, oxycodone MME = 1.5, codeine MME = 0.15.

Therefore, a maximum of 50mg hydrocodone/day, 30mg of oxycodone/day or 75mg of codeine/day).[55]

Conclusions:

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

Disclosure:

None of the authors report any disclosures. The opinions expressed are those of the authors and do not represent those of the Department of Veterans Affairs or the U.S. government.

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