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Opioid Prescribing and Risk Mitigation Implementation in the Management of Acute Pain: Results from the National Dental PBRN

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Abstract

Background—Minimal information exists regarding the consistency and correlates of dentists' implementation of risk mitigation strategies when prescribing opioids, including risk screening, prescription drug monitoring program use (PDMP), and patient education.

Methods—A web-based, cross-sectional survey was conducted among practicing dentist members of the National Dental Practice Based Research Network (n=822). The survey assessed pain management prescribing practices and risk mitigation implementation. Survey data were linked with network Enrollment Questionnaire data to include practitioner demographics and practice characteristics.

Results—A minority of dentists reported prescribing opioids only (11%) or opioids in combination with recommendation for NSAIDs/Acetaminophen (18%) to half or more of their patients needing management of acute pain. Higher opioid prescribing was significantly associated with less-consistent implementation of PDMP use (r = −.20) and patient education (r = −.11).

Conclusions—A majority of dentists reported infrequent PDMP use and counseling patients regarding risks, storage, and disposal of opioids. Higher frequency of opioid prescribing was associated with less consistent risk mitigation implementation.

Practical Implications—When opioid prescribing is indicated, risk of misuse and diversion may be mitigated by consistent PMDP use and provision of patient education. Dental education in this arena is needed.

Keywords

Pain; Patient Education; Prescriptions; Drug

Opioids were responsible for more than 33,000 deaths in 2015, representing a 23% increase from the prior year.[1] Tens of thousands more suffer with opioid use disorders and unintentional overdose.[2] Recent estimates have placed the national public health burden associated with the opioid epidemic - including health care, lost productivity, and treatment - at over 75 billion dollars in annual expense.[3] Many individuals who go on to develop opioid use disorders, including transition to heroin use, report that early exposure to opioids was through a legitimate prescription or prescription shared from family or friends.[4,5] This risk is particularly highlighted among adolescents and emerging adults, with recent research suggesting that lifetime non-medical use of prescription opioids is highly correlated with,

and most often preceded by, medical use of prescription opioids.[6] Furthermore, a combination of medical and non-medical opioid use in adolescence, as well as adolescent non-medical use in isolation, have been associated with elevated risk for substance use disorder symptoms in adulthood at adjusted odds ratios of 1.5 and 2.6, respectively.[7]

Dentists prescribe a notable volume of immediate release opioids, accounting for an estimated 12% of annual immediate release opioid prescriptions annually, and prior research suggests that a majority of patients report having unused medication leftover from their post-procedural dental prescription.[8–10] Opioids account for a nearly one-third of prescriptions issued by dentists.[11] Due in large part to the commonality of third molar extraction procedures, dental opioid prescribing is particularly frequent for adolescent patients, a group at increased risk for misuse.[10,12,13] Despite risk for misuse and diversion of medication among dental patients, dentists, along with most healthcare providers outside of addiction medicine and psychiatry, have traditionally lacked the training and systems to screen and address patient's presenting in their practice with addiction.[14–16] Furthermore, previous research suggests that dentists do not regularly implement recommended risk mitigation strategies - including screening for prescription drug abuse/misuse, querying a prescription drug monitoring program (PDMP; enacted in all US states except Missouri), and providing thorough patient education regarding safe use, storage, and disposal when prescribing opioid medications for pain management.[17,18]

Whereas training relevant to identification and prevention of diversion is associated with a more consistent risk mitigation implementation, relatively little information exists to assist in targeting such training to the most relevant audience for maximum impact.[18] The objectives of the current study were to use data from a national survey of practicing dentists focused on the prescribing of immediate release opioids in the context of acute pain and post-procedural management in dental practice settings to: (a) identify practitioner and practice-level factors associated with conservative opioid prescribing; and (b) determine the association between prescribing practices and consistent implementation of opioid prescribing risk mitigation strategies, including assessment of prescription drug abuse history, PDMP use, and provision of patient education.

Methods

This study engaged the National Dental Practice-Based Research Network. The network is a consortium of dental practices and dental organizations focused on improving the scientific basis for clinical decision-making.[19] Detailed information about the network is available on its web site (https://www.nationaldentalpbrn.org). The Institutional Review Board (IRB) at the Medical University of South Carolina and IRBs associated with the network approved this project. A total of 1,428 network members were randomly selected and invited to participate in this cross-sectional survey study. Members were selected for invitation if they: (a) had completed a network Enrollment Questionnaire; (b) were dentists licensed in the U.S. who maintained an active practice email address at which they could be contacted; and (c) reported practicing primarily in general dentistry, endodontics, periodontics, dental public health, prosthodontics, or oral/maxillofacial surgery. Member dentists were excluded from selection if they did not provide a practice email address in the Enrollment

Questionnaire or if they endorsed a specialty practice in only orthodontics, oral pathology, or pediatric dentistry.

The survey was administered online via REDCap, and consisted of 137 potential items (publicly available at http://nationaldentalpbrn.org/study-results/reducing-prescription-opioid-misuse-dental-provider-intervention-development-survey.htm).[20] Topic areas broadly included: (a) pain management prescribing practices; (b) use of risk mitigation strategies; and, (c) relevant training experiences. Survey data were paired with practitioner and practice characteristics (e.g., specialty, setting, etc.) from the network's Enrollment Questionnaire items which had documented test/re-test reliability and which were taken from previous work in a practice-based study of dental care (publicly available at http://nationaldentalpbrn.org/study-results/reducing-prescription-opioid-misuse-dental-provider-intervention-development-survey.htm).

The initial draft of this survey instrument was developed with feedback from the initial study team. Items were modeled after previously published surveys of opioid prescribing practices among primary care physicians.[21] This initial draft of the survey instrument was reviewed by a focus group of dental providers (n=10) who provided critical feedback regarding the content, clarity, and presentation of the survey. The finalized survey instrument was then piloted in its current REDCap format for data collection and management. Dental practitioners (n=87) were recruited for the survey pilot through a single Listserv announcement disseminated by the South Carolina Dental Association.[18] Following the statewide pilot, content of the survey was iteratively refined through a series of feedback from the National Dental PBRN Executive Committee, the NIDCR Clinical Studies Group, and the National Dental PBRN Regional Coordinators (RCs). This iterative development and pilot process has maximized dental practitioner input in an effort to increase the relevance of the survey and its findings to dentists. Among the 50 test/re-test participants, the mean (SD) time between test and re-test was 18.6 (6) days. For categorical variables, agreement between time 1 and time 2 showed a median kappa of 0.5 (IQR: 0.3, 0.7). Median test-retest reliability for numeric variables was 0.6 (SD=0.2).

Study recruitment took place between August 29, 2016 and December 5, 2016. Dentists received an invitation email explaining the study and inviting them to participate using a unique electronic link to the questionnaire. Although dentists could complete the survey in multiple visits, completion in a single sitting was recommended. Dentists received 3 weekly email reminders, two from the study Principal Investigator and a third from their respective network RC. Dentists who had not responded after 4 weeks (and 3 reminders) received up to two additional reminder contacts (via telephone, fax, email, or postal mail) from their respective National Dental PBRN RC. Dentists who had not completed the survey within a 10-week timeframe were considered non-respondents and their survey link was deactivated. Dentists were offered a $50 remuneration code for their time spent completing the survey.

Data Analysis Plan

The following variables were assessed: (a) dentist demographics; (b) practice characteristics, including specialty, practice type, rural/non-rural location, percent of patients visiting only once, and percent of patients only visiting for emergent situations; (c) pain management

prescribing, including frequency of prescribing nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, opioids, and combination medications; and (d) risk mitigation strategy implementation, including medical history, PDMP use, and patient education. Three calculated variables were included in analyses: (a) *Medical History* variable summed items regarding frequency of current prescription drug abuse, history of drug or alcohol abuse, history of substance abuse treatment, and history of/or current chronic pain. Lower scores (range: 4 to 8; Mean=5.6; Median=5) on this item represented more consistent inclusion in medical history. (b) *Patient Education* variable summed items for frequency of educating patients regarding risks, side effects, secure storage, disposal, and non-medical use risks associated with opioid medication. Lower scores (range: 5 to 35; Mean=21.7; Median=23) on this item represented more consistent provision of patient education. (c) *PDMP Use* variable summed items regarding frequency of checking the PDMP prior to any opioid prescription, prior to prescribing to high-risk patients, prior to prescribing to new patients, and prior to prescribing refills. Lower scores (range: 4 to 28; Mean=13.8; Median=14) on this item represented more frequent use of the PDMP.

All data were consolidated in an SPSS database for analysis. Frequency distributions and descriptive statistics were computed for all outcome variables of interest. Associations of practitioner- and practice-level characteristics with pain management prescribing practices and risk mitigation implementation were examined using Spearman Rho correlation, one-way analysis of variance (ANOVA), and univariate analysis as appropriate.

Results

Sample Demographics

A total of 822 (58% of invited) dentists completed the survey. Non-participating dentists either accessed but did not complete (49; 3%), did not access (508; 36%), refused participation (10; 0.7%), no longer met eligibility criteria (6; 0.4%), or had provided an inactive email address (33; 2%). Participating dentists did not differ from non-participating dentists with respect to gender, race, Hispanic/Latino ethnicity, or rural practice location status. Participating dentists were more likely than non-participating dentists to be a general practitioner (v. specialist; X^2 (N=1,428, df=1) = 15.3, p<.001; 61% of general practitioners participating, compared to 49% of specialists) and were significantly younger (F (1, 1,408) = 12.6, p<.001) than non-participating dentists by a mean of 2 years. Table 1 presents descriptive information about participating dentists and their respective practice characteristics. Participating dentists were predominantly Caucasian males in a non-rural general practice of which they were either an owner or employee.

Pain Management Strategies and Risk Mitigation Implementation

Fifteen respondents indicated either that they never had a DEA license to prescribe controlled substances (n=1) or had allowed their DEA licensure to lapse and were not currently licensed (n=14). Only dentists with an active DEA license responded to subsequent questions regarding specific opioid prescribing practices and risk mitigation implementation (n=807). Dentists' responses to questions regarding the frequency with which they recommended or prescribed specific medications (i.e., recommending NSAIDs,

recommending acetaminophen, opioids, and combination of prescribing opioids and recommending NSAIDs or acetaminophen) for pain management in the past six months of their practice are presented in Table 2. When opioids are prescribed, Table 2 also presents frequency of types of opioid prescribed, dosage instructions, and number of days supplied.

The majority of dentists reported including assessment of current tobacco use (n=772; 94%), current alcohol use (n=620; 75%), current illicit drug use (n=570; 69%), as well as history of mental health treatment (n=592; 72%), history of or current chronic pain (n=578; 70%), history of substance abuse treatment (n=520; 63%) in their medical history collection. Slightly more than half of dentists reported assessing for current prescription drug abuse (n=431, 52%) and history of substance abuse treatment (n=427, 52%).

Table 3 presents dentists' responses regarding their frequency of providing specific tenets of patient education, including explaining the risks of short-term opioid use, potential side effects, importance of secure storage, appropriate disposal of unused medication, and the risks associated with non-medical opioid use. Half of participating dentists (n=416; 51%) reported having ever accessed their state PDMP. Dentists' reports of their frequency of conducting PDMP queries in specific prescribing situations (e.g., high-risk patients, refills) are presented in Table 3.

Correlates of Opioid Prescribing and Risk Mitigation Implementation

Higher self-reported frequency of only prescribing opioids for pain management was significantly associated with: (a) being a specialist (v. generalist, $F(1,820)=4.4$, $P<.05$); (b) Oral Maxillofacial Surgeon (OMFS) specialty training ($F(1,820)=32.3$, $p<.05$); (c) greater proportion of practice patients presenting for a single visit ($r=0.17$, $p<.05$); and, (d) greater proportion of practice patients presenting occasionally or for emergency/problem visit ($r=0.19$, $p<.05$). Higher self-reported frequency of prescribing opioids in combination with recommendation of NSAIDs or Acetaminophen for pain management was significantly associated with: (a) being a specialist (v. generalist, $F(1,820)=11.8$, $P<.05$); (b) endodontist specialty training ($F(1,820)=17.5$, $p<.05$); (c) prosthodontists specialty training ($F(1,820)=7.7$, $p<.05$); (d) OMFS specialty training ($F(1,820)=13.9$, $p<.05$); (e) greater proportion of practice patients presenting for a single visit ($r=0.09$, $p<.05$); and, (f) greater proportion of practice patients presenting occasionally or for emergency/problem visit ($r=0.15$, $p<.05$).

Higher frequency of assessing for substance misuse/abuse in medical history was associated with: (a) higher frequency of prescribing an opioid only ($r=-0.08$, $p<.05$); (b) higher frequency of opioid prescribing in combination with recommendation of NSAID or acetaminophen use ($r=-0.08$, $p<.05$); and, (c) OMFS specialty training ($F(1,820)=13.9$, $p<.05$). Higher frequency of providing patient education was significantly associated with: (a) less frequent prescribing of an opioid only ($r=0.11$, $p<.05$) and (b) less frequent prescribing of an opioid in combination with recommendation for an NSAID or acetaminophen ($r=0.10$, $p<.05$). Higher frequency of PDMP use prior to opioid prescribing was significantly associated with: (a) less frequent prescribing of an opioid only ($r=0.20$, $p<.05$); (b) less frequent prescribing of an opioid in combination with recommendation for an NSAID or

acetaminophen (r=0.22, p<.05); and, (c) lower proportion of practice patients presenting occasionally or for emergency/problem visit (r=0.10, p<.05).

Discussion

Best practice recommendations and preclinical and clinical research supporting the use of NSAIDs as the first-line therapy option for acute pain management. Results of the current study indicate that whereas a majority of dentists rarely or seldom prescribe opioids, a substantial minority of dentists prescribe opioids only (11%) or do so in combination with a recommendation to use NSAIDs or Acetaminophen (20%) to half or more of their patients.[22–24] Dentists in settings with greater volumes of high-risk patients (i.e., presenting for only one visit or presenting for emergency/intermittent care) reported a greater reliance on opioids for pain management. Consistent with PDMP data regarding dental opioid prescribing practices, the vast majority of dental opioid prescriptions reported in the current study were for immediate-release opioids, including hydrocodone and oxycodone products.[8] These products have high potential for abuse and diversion, as recognized by the re-scheduling of hydrocodone (from Schedule III to Schedule II) in 2014.[25,26]

Consistent with prior studies, the overall rate of PDMP use was low: slightly more than half (51%) indicated having ever accessed the PDMP, whereas only 19% and 23% reported querying in almost all or all instances of prescribing to a new patient or prescribing refills respectively.[18] Dentists' self-reported frequencies of opioid prescribing and PDMP use were significantly correlated such that dentists' report of higher opioid prescribing frequency was associated with less frequent PDMP use and provision of patient education. Furthermore, dentists practicing in settings with a higher volume of emergency or intermittent (rather than routine) patient visits also reported less consistent PDMP use. In addition to identification of doctor shoppers or intentional medication diversion, the proactive use of a PDMP offers a clinical care coordination tool and affords dentists the opportunity to identify patients with pre-existing, recently dispensed opioids and engage these patients in clinically oriented discussions regarding the pros and cons of their acute post-operative dental pain management options.[27] Consistent PDMP use may also assist in the identification of patients already receiving high daily morphine milligram equivalents (in the context of chronic pain treatment), or with concurrent use of other respiratory suppressants (e.g., benzodiazepines, sedatives, hypnotics) that increase risk for unintended overdose.[28–30] Evidence suggests that mandatory use policies increase dentists' use of a PDMP, which in turn is associated with more conservative opioid prescribing.[18,31] Mandatory use policies are being adopted by a growing number of states; however, many of these policies do not apply to short-term prescribing most relevant to dentists and, in the absence of mandated use, rates of registration and use of PDMP remain low among dentists.[32,33]

Half of dentists reported consistently (almost always or always) counseling patients regarding potential side effects of opioid medication. Only 27% of dentists reported consistently discussing risks of non-medical use (including misuse and sharing medication) and less than one-fifth of dentists reported consistently discussing secure storage (18%) and disposal of unused medications (13%). Patients, particularly adolescents, may often be unaware of what behaviors constitute opioid misuse, such as sharing medication with family

and friends, as well as the risks associated with these behaviors.[34] Patients may also be unaware of the potential for their medication to be diverted or misused by others without their knowledge if not securely stored and appropriately disposed.[35,36] Therefore, once the decision to prescribe an opioid has been made, patients would benefit from dentists consistently providing them with standardized education regarding the importance of using the medication only as prescribed, potential consequences of sharing their medication, and how to securely store and dispose of any unused medication.

The current study focused on the prescribing of immediate release opioids in the context of acute pain and post-procedural pain management in dental practice settings. This study does not speak to the management of chronic pain conditions (e.g., pain of idiopathic onset, oral medicine disorders) or identify oral medicine or orofacial pain specialists as a unique subset of survey participants. Describing prescribing practices in the context of chronic pain management is an important area for future study as management of chronic orofacial pain conditions constitute an important component of the practice of oral medicine. Recruitment for this study leveraged the network resources to follow-up with non-respondents resulting in a 58% overall response rate among all invited dentists, and a 59% response rate among eligible invited dentists with an active contact email address. Existing data from the network Enrollment Questionnaire allowed for examination of response bias among invited dentists. However, network members were not recruited randomly, so factors associated with network membership (for example, greater likelihood of interest and/or experience in clinical research, and potential for advanced education beyond that of dental school training) may make network clinicians unrepresentative of clinicians at large. Nonetheless, analyses from the network have demonstrated that network practitioners have much in common with the profession at large, albeit with some differences in characteristics while also providing substantial diversity in these characteristics.[37–38] Further, findings from several network studies document that network dentists report patterns of diagnosis and treatment that are similar to patterns determined from non-network dentists; [39–44] and the similarity of network dentists to non-network dentists using the ADA Survey of Dental Practice.[45] Still, generalization beyond network members should be done with appropriate caution. Although efforts were made to maximize confidentiality in data collection procedures (i.e., online survey), all data were cross-sectional, retrospective, and subject to self-report bias. No objective prescribing data were collected; however, dentists' self-report of prescribing practices in the current study generally correspond with objective reports of dental opioid prescribing.[8] Given the wide variance in type, intensity, and duration of pain treated by dental practitioners, differences in prescribing patterns could be substantively impacted by the procedures performed or specialty. As such, conclusions of this study may most represent behaviors of specialties that are the most likely to encounter patients in moderate to severe pain such as endodontists and OMFS. The survey was necessarily brief and utilized closed-ended response options to facilitate participation; however, these characteristics also limited the amount and depth of information collected. Factors in the dentists' broader ecology that were not assessed by the current survey (e.g., PDMP policy, mandated continuing education, prevalence of prescription drug abuse in practice-area) could have significantly contributed to the findings of this study. Additional work is warranted to

clarify, expound, and corroborate survey responses, particularly with respect to frequency of pain management strategies and risk mitigation implementation.

Conclusions

The American Dental Association recently released a *Statement on the Use of Opioids in the Treatment of Dental Pain* which includes recommendations to consider NSAIDs as a first-line therapy option for dental pain management and, in instances of opioid prescribing, to consistently implement risk mitigation strategies that include conducting a thorough medical history that includes consistently assessing for patient (and family) history of addiction, querying a PDMP database, and counseling patients regarding their role in preventing misuse and abuse via appropriate use, secure storage, and disposal of unused medications.[22] Practical implications of the current study suggest that dentists prescribing higher volumes of opioids in contexts that connote additional risk (e.g., new patients, emergency visits) were less likely to consistently implement recommended risk mitigation strategies. Outreach efforts to encourage risk mitigation implementation by dentists should be continued, including development and dissemination of formal continuing education, dental school curricula, and residency training, as well as informal communications through professional and practice-based research networks.

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Table 1

Demographic and descriptive information for participating dentists and their respective practices (N=822).

Variable	Frequency	Percent of Total Sample
Practitioner Sex,		
Male	582	70.8%
Female	231	28.1%
Practitioner Ethnicity		
Hispanic	42	5.2%
Non-Hispanic	771	93.8%
Practitioner Race		
White or Caucasian	660	80.3%
Black or African American	39	4.7%
American Indian or Alaskan Native	3	0.4%
Asian	80	9.7%
Native Hawaiian or Pacific Islander	2	0.2%
Other	29	3.5%
Practitioner Type		
General Practitioner	635	77.3%
Specialist	187	22.7%
Practice Type		
Private Practice	647	78.7%
Managed Care Organization	64	7.8%
Public Health/Community/Government	46	5.6%
Academic Setting	58	7.1%
Specialty Training		
Endodontist	59	7.2%
Periodontist	74	9.0%
Prosthodontist	28	3.4%
Oral Maxillofacial Surgeon	27	3.3%
Practitioner Network Region		
Western	132	16.1%
Midwest	96	11.7%
Southwest	177	21.5%
South Central	134	16.3%
South Atlantic	134	16.3%
Northeast	149	18.1%
Practice Location [a]		
Inner City of Urban Area	119	14.5%
Urban (not inner city)	229	27.9%
Suburban	357	43.4%
Rural	112	13.6%
Active DEA License		

Variable	Frequency	Percent of Total Sample
Yes	807	98.2%
No	1	0.1%
Not Current, But In the Past	14	1.7%
Variable		Mean (SD)
Practitioner Age		53. (11.6)
Percent of Practice's Patients who come for One Visit Only		12.6% (18.6)
Percent of Practice's Patients who come Intermittently or for Emergency Visits Only		13.6% (12.5)

*Variables that do not sum to 100% reflect missing data.

[a]When assessed for correlation with prescribing and risk mitigation, practice location was dichotomized into "Rural" and "Non-Rural" practice location.

Table 2

Number of dentists reporting various frequencies of pain management strategy implementation (N=822).

	Never	Few/Some	About Half	Most/Almost All	Always
NSAIDs only	6	200	83	475	58
Acetaminophen only	104	513	51	134	20
Opioids only	221	510	52	39	0
Combination	191	483	59	85	4
*Hydrocodone	131	261	44	333	38
*Oxycodone	439	352	10	5	1
*Codeine	236	469	38	54	10
*Demerol	758	49	0	0	0
*Extended Release	790	17	0	0	0
*Pro Re Nata (PRN)	230	115	25	192	245
*Fixed	345	138	25	137	162
*1 Day	513	257	10	19	8
*2 Days	364	305	32	88	18
*3 Days	234	251	47	240	35
*4–5 Days	354	262	34	137	20
*6–7 Days	591	161	11	37	7
*> Week	746	52	2	5	2

*Items only asked of respondents indicating that they had a current DEA license to prescribe controlled substances (n=807).

Table 3

Number of dentists reporting various frequencies of risk mitigation strategy implementation when prescribing opioids to patients for pain management (N=807).

	Never/Almost Never	Few	Some	Most	Almost Always/Always
Patient Education					
Explain risks	276	108	139	76	208
Side effects	103	47	123	126	408
Secure storage	467	69	88	36	147
Appropriate disposal	542	70	66	21	108
Non-medical use	297	94	114	82	220
PDMP Use *					
Prior to any Rx	142	82	61	23	111
Initial Rx to high-risk patient	42	37	34	27	279
Initial Rx to new patient	127	60	55	17	159
Refill	98	45	60	30	185

Patient education variables that do not sum to 807 reflect missing data.

* For PDMP variables, 416 dentists indicated having ever accessed the PDMP; however, three dentists who indicated never accessing their PDMP completed follow-up questions regarding PDMP access in specific instances. These data were included in the table above, as well as in subsequent analyses as entered.