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Patterns of post-operative pain medication prescribing after invasive dental procedures

Andrei Barasch, DMD, MDSc[1,*], **Monika M. Safford, MD**[2], **Sandre F. McNeal, MS**[1], **Michelle Robinson, DMD MA**[1], **Vivian S. Grant, MS, RDH**[1], and **Gregg H. Gilbert, DDS, MBA**[1]

[1]Department of General Dental Sciences, University of Alabama at Birmingham School of Dentistry, Birmingham, Alabama

[2]Division of Preventive Medicine, University of Alabama at Birmingham School of Dentistry

Abstract

We investigated disparities in the prescription of analgesics following dental procedures that were expected to cause acute post-operative pain. Patients over the age of 19 years who had been treated by surgical and/or endodontic dental procedures were included in this study. We reviewed 900 consecutive charts and abstracted data on procedures, patients, and providers. We used chi-square and logistic regression models for analyses.

There were 485 White subjects 357 African-American subjects included in this review; 81% of the African-American and 78% of White patients received a post-operative narcotic prescription (p=0.56). In multivariate regression models, patients over age 45 (p=0.003), those with insurance that covered medication and those with pre-existing pain (p=0.004) were more likely to receive narcotic analgesics. Students prescribed more narcotics than residents (p=0.001). No differences were found by race in prescribing analgesics.

Keywords

analgesic prescriptions; race; dental; insurance

Introduction

Previous studies1–4 have suggested that African Americans (AA) are undertreated for pain in the United States. Racial disparities in pain assessment and treatment have been reported across virtually all evaluated healthcare settings, from the recovery room to the emergency department, and across multiple types of pain, including acute pain, cancer-related pain, and chronic nonmalignant pain.[1–4]

Few studies in dentistry have focused on racial disparities. Those we identified reported that patients in practices with more African Americans received fewer dental diagnostic radiographs,[5] and that patients who were African Americans had higher odds of receiving tooth extractions and lower odds for conservative treatments, regardless of their socioeconomic status.[6] Despite the fact that post-operative pain is common in dental practice,[7,8] we are not aware of any study that has explored whether racial disparities in pain management have been reported in dental care. Similarly, other demographic influences on dental post-operative pain management, such as age, have been poorly explored.[9]

Corresponding author abarasch@uab.edu.

In this study, we present results of a retrospective cohort study of provider-, procedure- and patient-specific factors that influence post-operative pain management at the University of Alabama at Birmingham (UAB) Dental Clinics following procedures that predictably and consistently require post-operative analgesics. We tested the hypothesis that patients who are African Americans receive significantly fewer narcotic analgesic prescriptions than their White counterparts. Variables of interest for this study included patient demographics, insurance status, and pre-existing pain level as well as the specific dental procedures.

Methods

The UAB Dental Clinics are located in downtown Birmingham, Alabama, and provide a full range of services to their clientele, which include at least 25% to 30% African Americans. In these clinics, race/ethnicity and other demographic information are self-reported by patients. Dental care is provided mostly by faculty preceptor-supervised dental students and by residents from various specialties. The prescribing of pain medication is individualized, without a school-wide standardized protocol for post-operative management. The Institutional Review Board at our University approved this study protocol.

In 2008, we conducted a computerized detection of all patients who received endodontic or surgical procedures that involved violation of bone and/or periosteum in the School of Dentistry. These procedures were selected because they result in predictable post-procedure moderate-to-severe pain, and opiate/opioid medications are frequently but not always prescribed after these procedures.[7,8,10] Using American Dental Association (ADA) procedure codes (Table 1), we identified 1,488 potential eligible procedure-visits for that calendar year. A procedure-visit was defined as a patient care encounter in which one or more eligible procedures occurred during that visit. Our protocol was to search these procedure-visits in a consecutive manner until 900 eligible patients (80% power to detect expected differences) were confirmed. If the same patient had an additional eligible procedure-visit at a later time in 2008, only the first procedure-visit was included in the study. Ultimately, we reviewed 1,188 consecutive charts until 900 records were available that fulfilled the pre-established inclusion criteria of being age 19 years or older and having received any of the dental procedures identified in Table 1 between January 1, 2008, and December 31, 2008. We did not include children because the surgical procedures we focused on are uncommon in that population, and endodontic procedures in primary teeth do not typically result in pain. Patients were excluded if they did not actually undergo one of the procedures of interest (12 of the 1,188 charts reviewed), or if race or pain medication prescription were not recorded in the chart (276 of 1,188 charts reviewed).

Data were collected using a structured dental record review instrument, which included the variables listed in Table 2. The main outcome was the prescription of a narcotic medication, to facilitate comparability with past studies.[1–4] In addition, a prescription or recommendation of a non-steroidal anti-inflammatory drug (NSAID) was also recorded. Narcotic medications included all drugs that contained an opiate/opioid by itself or in combination with other substances. Drugs that contained only a cyclooxygenase (COX) inhibitor were included in the NSAID category. Over-the-counter (OTC) medications were also noted and included as confounding variables, if they affected pain levels or interacted with prescription analgesics.

Other data were grouped by conceptual domains of factors that influence pain management, including patient, procedure and provider factors, which were operationalized for analysis. Subject factors included age (categorized as younger than 45, 45–65, and older than 65), ethnicity and gender, medical conditions, current medications, and allergies. Drugs with potential interactions with one or both types of analgesics (warfarin, aspirin, corticosteroids,

benzodiazepines, antihistamines, gabaminergics, and other CNS depressants) were recorded separately. Analgesics that the subjects were taking at the time of the appointment, and health insurance coverage for medications, were also recorded.

Provision of in-office, pre- or post-procedural analgesics and complications constituted the procedure-related factors, while the provider-related factor was the level of training of the main operator (student, resident, or attending faculty). Two investigators verified 10% of the data and 92% (n=82) were in full concordance, while 8% (n=8) had additional data abstracted. All data were double entered into the computer to verify accuracy.

Statistical analysis

Patient-, procedure- and provider-related variables were examined in bivariate analyses using chi-square, Mantel-Haenszel and Cramer's V methods. Phi and Contingency coefficients were also obtained. Factors with associations with $p<0.10$ were entered into a multivariate analysis, grouped by patient, procedure or provider domain, entering variable groups in a stepwise fashion. The dependent variable in these logistic regression models was prescription of an analgesic. Adjusted odds ratios and their 95% confidence intervals were estimated for the odds of receiving narcotic prescriptions. To facilitate interpretation, we also generated predicted probabilities and 95% confidence intervals, and contrasted them with the unadjusted percentage of individuals who received narcotic prescription in each category of covariate. All statistical analyses were carried out using SAS version 9 (SAS Inc., Cary, North Carolina).

Results

The type and number of procedures performed and the analgesic medications prescribed are listed in Table 1. The vast majority of narcotic prescriptions consisted of combinations of acetaminophen/hydrocodone (67%) and acetaminophen/oxycodone (28%). No morphine or morphine derivatives had been prescribed. Prescriptions for NSAID were either high-dose ibuprofen (57%) or naprosin (43%). Of the 900 records reviewed, 485 (53.9%) of the subjects were White and 357 (39.6%) were African American. Due to their low numbers and a lack of complete racial information, 58 subjects who had identified themselves as Latino or Asian were not included in the racial analyses but were counted in all others. The two racial groups were well balanced for age, gender, and type of procedure they had undergone (Table 2). A larger percentage of African Americans (81%) received a narcotic prescription than subjects who were White (78%), but in unadjusted analysis, the difference did not reach statistical significance ($p=0.56$). Similarly, there was no statistically significant difference in prescription type by patient gender ($p=0.87$). Drug allergies, medical conditions, and other medications did not affect the analgesic prescription. The majority of subjects (93%) who received periodontal surgery had pre-operative analgesics consisting of 400mg ibuprofen. No other subjects received pre-operative analgesics.

Several variables were significantly associated with receipt of a narcotic prescription. Specifically, subjects who were over the age of 45 years (83% vs. 75% for those younger than 45, $p<0.003$), those with health insurance covering medication (83% vs. 66%, $p<0.0001$), and those with pre-operative acute oral pain (85% vs. 78% without pain, $p<0.004$), were more likely to receive a prescription for narcotic analgesics. Approximately 5% of subjects who presented with moderate or severe oral pain were prescribed both narcotics and NSAIDs. Due to their low number, these subjects were not considered separately but were included in the narcotic prescription group for the analysis. The associations between these variables and receipt of a narcotic prescription remained statistically significant after adjusting for provider and procedure type.

Prescriptions for narcotic analgesics for specific procedures ranged from 0% for periodontal surgery to 93% for extraction of impacted molars ($p<0.0001$). Univariate analysis by prescriber type revealed that dental students were significantly more likely to prescribe narcotics than residents (90% vs. 73%, $p<0.0001$). This association held for both races. Residents did not prescribe any analgesics for 26% of their patients who underwent an invasive procedure, while students prescribed analgesics for only 9% of their patients ($p<0.0001$). Students prescribed NSAIDs for 9% of their patients, whereas residents did not prescribe this class of analgesics at all. These differences in prescribing remained statistically significantly different after accounting for procedure, patient age, pain, and insurance status. When prescriptions were analyzed as a dichotomous variable (narcotic vs. no narcotic), all of the above variables remained significantly associated.

Discussion

We found no evidence in this study that the prescribing patterns for post-operative pain medications in the dental setting were different for African Americans compared to White subjects. This finding is different from past studies,[1–4] which have reported that racial disparities in analgesic-prescribing practices existed in other types of healthcare. In particular, physicians have reportedly been reticent about prescribing opiate/opioid medication for minority patients,[4] despite a national pain care quality improvement initiative implemented in the 1990s.[12,13] While small, focused studies[11–13] reported limited or no racial disparity in pain management, Pletcher *et al.*[2] reported in a large national study that while overall opioid prescriptions in emergency departments rose over the decade from 1995 to 2005, African Americans consistently received about 7% to 10% lower rates of narcotic medication than patients who were White who had similar presenting complaints.

Various articles[8,9,14] have emphasized that pain following dental procedures is significant. A report from England[7] on 75 subjects described that 93% had post-operative pain; 34% rated it as severe and 46% as moderate. Despite these well-publicized problems, we were unable to identify any English language publication describing post-dental procedure pain control by race and/or ethnicity. Thus, our study likely represents the first such report in peer-reviewed literature.

While our findings indicate that ethnicity was not a factor, prescription practices differed significantly based on the subject's age, insurance status, and pre-existing pain. Unmet analgesic needs may be particularly harmful to older subjects, who are more vulnerable to pain-induced cardiovascular disturbances.[15] On the other hand, evidence[16] suggests that older subjects may be less likely to experience pain associated with acute pathologies, and research[17] consistently finds that older subjects administer less morphine via intravenous patient-controlled analgesia than younger subjects in the post-operative settings. These findings have led clinicians to perceive that older individuals were requiring fewer opioids for acute pain syndromes.[18] Our finding that patients over 45 years of age received narcotics more often may suggest that this perception is not prevalent among dental practitioners.

The fact that patients with insurance received more narcotic medication could be attributed to their ability to purchase more expensive prescription drugs. Many indigent patients may be advised to use over-the-counter analgesics, which typically are less expensive. This issue requires further study. Similarly, it is unclear why patients coming to their appointment with acute pain were given narcotics more often, but we can speculate that such patients present with symptoms not relieved by over-the-counter drugs and may request stronger medications.

Another finding of this study was that dental students prescribed narcotics significantly more often than residents. This remained true after accounting for analgesic premedication and type of procedure. This fact will also need to be further explored as dental students' prescribing may be entirely determined by their supervising faculty, whereas care provided by residents may be less influenced by faculty supervision during the patient visit. This information was not available in the records that were reviewed for this study.

Different types of dental procedures may predictably produce different expectations for post-operative pain. Unfortunately, few data exist to guide the clinician in this respect. As expected, we showed that dental extractions consistently resulted in more post-operative analgesic prescriptions than periodontal and endodontic procedures. Whether this is an indication of lower levels of pain associated with these two procedures compared to extractions remains to be tested.

Our study had several limitations. It was performed at an academic institution and thus it may not reflect the behavior of private practice or community clinic dentists treating similar patients. Nevertheless, our finding that there was no racial disparity in prescribing stronger opiate analgesics is encouraging and may suggest a model of care worth emulating. We collected retrospective data from healthcare records created during the course of clinical care, which may have resulted in some loss of completeness and consistency. In addition, we were not able to reliably abstract certain factors, such as the clinical difficulty or the length of time a procedure required. These factors may determine the type of discomfort a patient experienced and the type of analgesic prescribed. Lastly, the observational design of this study precludes any causal inferences of the associations we found.

Conclusion

As there have been no previous studies to show disparities in pain medication prescribing in dentistry, the pilot study we present here is a logical initial step. This research should be expanded to include several sites with additional minority groups, since undertreatment of pain has been reported for Latinos as well as African Americans.[1,2] Thus, while our findings are preliminary, the study of pain management in dentistry is important and should be investigated further.

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Table 1

Analgesic prescription for specific procedures.

Procedure	*ADA Code*	*Total*	Type of Analgesic Prescription		
			NSAID (N=15) n (%)*	*Narcotic* (N=713) n (%)*	*None (N=171) n (%)*
Root canal on a molar tooth	D3330	122	4 (3)	19 (16)	99 (81)
Osseous surgery	D4260	4	0	1 (25)	3 (75)
Surgical implant	D6010	14	2 (14)	8 (57)	4 (29)
Surgical removal of an erupted tooth	D7210	685	8 (1)	615 (90)	62 (9)
Extraction of partially bony-impacted tooth	D7230	47	0	45 (96)	2 (4)
Removal of completely bony-impacted tooth	D7240	27	1 (4)	25 (93)	1 (4)

ADA=American Dental Association. NSAID=Nonsteroidal Anti-inflammatory Drug.

*Patients who received both NSAID and Narcotic entered as Narcotic.

Table 2

Patient population and variables collected.

	African-American N=357	White N=485
Prescription		
Narcotic	289 (81%)	380 (78%)
None	68 (19%)	105 (22%)
Gender		
Male	162 (45%)	241 (49%)
Female	195 (55%)	243 (51%)
Age *(range 19–84):*		
19–45	132 (37%)	193 (40%)
46–65	95 (27%)	108 (22%)
>65	130 (36%)	184 (38%)
Insured		
Yes	289 (81%)	383 (79%)
No	67 (19%)	102 (21%)
Pain at baseline*		
Yes	243 (68%)	324 (67%)
No	16 (4%)	21 (4%)
Contraindications		
Narcotic	5 (1%)	10 (2%)
NSAID	6 (1%)	14 (3%)
Both	0	2

*Missing for 295 subjects.