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Opioid Prescribing Patterns Following Dental Visits Among Washington State Medicaid Beneficiaries in 2014 and 2015

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Abstract

Background: Dentists contribute to the prevailing opioid epidemic in the United States. Among the Medicaid population, little is known about opioid prescribing by dentists.

Methods: We performed a retrospective cohort study of Washington State Medicaid beneficiaries with dental claims in 2014 and 2015. The primary outcome was the proportion of dental visits associated with an opioid prescription. Visits were categorized as “invasive” or “non-invasive” using procedure codes, and each beneficiary was categorized as “low” or “high-risk” using their prescription history from the Prescription Drug Monitoring Program.

Results: 126,660 (10.3%) of all dental visits among the Washington State Medicaid population were associated with opioid prescriptions, most of which were invasive (66.9%). However, non-invasive dental visits, and visits for beneficiaries with a history of prior high risk prescription use, were associated with significantly higher mean days’ supply and mean quantity of opioids prescribed. The multivariate logistic regression showed that the probability of having an opioid-associated visit increased by 35.6 percentage points (pp) when the procedures were invasive, or 11.1pp, when the beneficiary had a history of prior high risk prescription use.

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Conclusion: This baseline of opioid prescribing patterns following dental visits among the Washington State Medicaid population in 2014 and 2015 can inform future studies examining the impact of policies on opioid prescribing patterns and reasons for the variability in the dosage and duration of opioid prescriptions associated with non-invasive visits.

Practical Implications: Dentists must exercise caution when prescribing opioids during invasive visits and to patients with prior high risk prescription use.

Keywords

Dental care; Schedule II Substances; Opioids; Prescription Drug Monitoring Programs; Public Insurance

Background

In October 2017, the United States (US) Department of Health and Human Services (DHHS) declared the opioid crisis a public health emergency.[1] With more than 100 opioid-related overdose deaths occurring daily and over 11 million people misusing prescription opioids, the opioid epidemic is estimated to cost the US $506 billion annually.[2] Dentists are responsible for 12% of all immediate-release opioid prescriptions[3,4] making them one of the top five prescribers of opioid analgesics among healthcare professionals in the US[3,5-7] and significant contributors to the prevailing opioid epidemic.[8-11] In addition to the sheer volume of opioid prescriptions, concurrent prescriptions and wide variations in the quantity of opioids prescribed by dentists have also been the subject of recent research.[12-15] In over 50% of cases, dental-related opioid prescriptions were dispensed when a prescription already existed, and the majority (80.9%) occurred within 30 days of the previous prescription.[14] Dental patients have also been shown to receive more than the recommended three days' supply for acute pain[12], thereby creating a potential for opioid dependence[16-18], and a preponderance of leftover pills that can serve as a source of opioid diversion.[10]

Similar to conditions in the emergency department (ED),[19] dental clinics are attractive to "opioid shoppers[1]" because most dental visits are intermittent and short-term.[20,21] Furthermore, dental electronic health record (EHR) systems are not universal and when in place are almost always isolated from medical EHRs, making the prompt identification of "prior high risk prescription use"[2] even more complex.[22] While Prescription Drug Monitoring Programs (PDMPs) have been employed by our medical colleagues to identify patients with prior high-risk prescription use as a way of combating the opioid epidemic,[23-25] this practice is yet to take hold in dentistry. The use of PDMPs by dentists, while sparse, has been shown to reduce opioid prescription rates.[26,27]

[1]Opioid shoppers are patients who obtain prescriptions from multiple doctors and pharmacies, for example using > 3 pharmacies and >3 prescribers to acquire opioids during any 90-day period.

[2]"Prior high risk prescription use" is defined as beneficiaries with: More than 3 prescribers within 12 months; More than 4 controlled substance II-V prescriptions within 12 months; More than 2 controlled substance II-V prescriptions within last 40 days; Any prescription for Methadone, Suboxone, Fentanyl Transdermal, Long-acting Morphine, or Long-acting Oxycodone within last 6 months; Any overlapping prescriptions for Narcotics (controlled substance II-V) and Benzodiazepines within last 6 months; More than 100 average MME/day (Morphine Milligram Equivalent/day) prescribed within last 40 days

Recognizing the role of dentists' in curbing the opioid epidemic,[3] the American Dental Association (ADA) released a policy statement supporting the following: Mandatory continuing education (CE) on safe opioid prescribing for dentists; limits on the dosage and duration of opioid prescriptions to no more than 7 days; and the utilization of PDMPs.[28] Similarly, at the state and federal levels, several initiatives[29-33] have been proposed to combat the opioid epidemic including: New opioid prescribing guidelines for both chronic and acute pain[34-36] mandating the use of PDMPs,[33,37] Good Samaritan overdose immunity laws,[38,39] and improved access to opioid-reversal medications such as Naloxone.[4041]

One aspect of the five-part DHHS opioid strategy is to increase the availability of "better data" that will improve our understanding of the opioid epidemic.[42] Consequently, dental researchers have sought to understand the factors related to opioid prescribing by dental professionals.[13,26,43] Of note, was a recent publication by the ADA Health Policy Institute which revealed a steady increase in opioid prescription rates from 2010-2015 among privately insured dental patients.[13] One third of these prescriptions were associated with "non-surgical" dental procedures, raising questions about their indications and appropriateness.[13]

The goal of this study is to describe opioid prescribing patterns following dental visits among Washington state Medicaid beneficiaries in 2014 and 2015, prior to the roll out of major state and nation-wide opioid policy initiatives. Understanding opioid prescribing patterns among Medicaid beneficiaries (typically lower-income individuals) is especially important due to their six-fold higher risk of fatal prescription opioid overdose compared to non-Medicaid populations.[44] These findings will provide a baseline from which to measure the impact of the new policies, as well as to inform ongoing interventions to reduce inappropriate opioid prescribing associated with dental visits.

Methods

Study Design:

We performed a retrospective cohort study of Washington State Medicaid beneficiaries. The Washington State Health Care Authority provided enrollment, dental claims and PDMP data linked at the beneficiary level for calendar years 2014-2015. The PDMP is an electronic record of all controlled substances dispensed by Washington state pharmacies. Unlike Medicaid pharmacy claims data, which may miss medications paid by a co-insurer or in cash, the PDMP captures all dispensed opioids regardless of payer. Comprehensive dental services were available for all adult Medicaid beneficiaries during the study time period.[45] The Institutional Review Boards of Washington State and Oregon Health & Science University (OHSU) approved this study.

Cohort Selection:

We included all adult (≥18 years) Washington Medicaid beneficiaries with any claims for dental services at a dental office during the study period. Beneficiaries enrolled in Medicare (dual-eligible) were excluded from the study. The unit of analysis was a dental visit defined as any claim submitted by a dental provider with a singular CDT (Code on Dental

Procedures and Nomenclature; see eTable 1) code or combination of codes occurring in one day.

Outcomes:

The primary outcome was the proportion of dental visits associated with a dispensed opioid prescription.

Measures:

Each visit was categorized based on the beneficiary's age, gender, race/ethnicity, coverage type (fee-for-service versus managed care), and enrollment under the 2014 Medicaid expansion of the Affordable Care Act (ACA; *adults between 100% and 138% of the federal poverty level, or 185% for pregnant women*). Visit types were categorized according to their associated dental disciplines (using CDT codes) and their degree of invasiveness (using recently published criteria[13]). Prior high risk prescription use was determined using PDMP look-backs from the date of the index dental visit and according to the following criteria defined by the Washington State Department of Health:

- More than 3 prescribers within 12 months
- More than 4 controlled substance II-V prescriptions within 12 months
- More than 2 controlled substance II-V prescriptions within last 40 days
- Any prescription for Methadone, Suboxone, Fentanyl Transdermal, Long-acting Morphine, or Long-acting Oxycodone within last 6 months
- Any overlapping prescriptions for Narcotics (controlled substance II-V) and Benzodiazepines within last 6 months
- More than 100 average MME (Morphine Milligram Equivalent)/day prescribed within last 40 days

Data Analysis:

Descriptive statistics (frequency count (N), percentage (%), confidence intervals (CI)) were calculated for all dental visit and beneficiary characteristics. Opioid prescription rates, means and standard deviations (SD) for the number of days' supply, quantity prescribed, and daily MME doses were also calculated for all opioid-associated dental visits. The MMEs for each prescription was determined using the following conversion factors[46-48]: Codeine: 0.15; Fentanyl Citrate: 0.13; Fentanyl Patch: 7.2; Hydrocodone: 1; Hydromorphone: 4; Levorphanol: 11; Meperidine: 0.1; Methadone: 3; Morphine: 1; Oxycodone: 1.5; Oxymorphone: 3; and Tapentadol: 0.4.

A logistic regression model assessed the association between having an opioid-associated dental visit and each beneficiary/ visit characteristic described above. All model results are presented as average marginal effects, i.e. change in the probability of having an opioid-associated dental visit as each measure increases by one unit). The use of average marginal effects rather than odds ratios allows for direct interpretation of the probability of the primary outcome. [49] The probability of the primary outcome is presented in percentage

points (pp)[3] which denote the absolute difference between two percentages (or probabilities). Standard errors were clustered at the patient level to control for multiple visits by the same patient. All data management and statistical analyses were performed in R version 3.3.2[50] and STATA MP 14.0.

Results

Beneficiary and Visit Characteristics:

Over the two-year study period, 348,731 unique adult beneficiaries had over 1.2 million dental visits. Table 1 shows the unadjusted frequencies of all dental visits distributed by beneficiary and visit characteristics. Majority of dental visits were made by beneficiaries who were aged 18-39 years (59.5%), female (62.5%), white (53.8%), under Managed care (89.6%), did not qualify for Medicaid under the ACA expansion (62.2%), and did not have a history of prior high risk prescription use (85.4%).

One out of every ten dental visits (N=126,660; 10.3%) was associated with a dispensed opioid prescription (primary outcome). Of these opioid-associated dental visits, two-thirds (66.9%) were invasive procedures, while one-third (33.9%) were for beneficiaries with prior high risk prescription use. Among the invasive opioid-associated dental visits, oral and maxillofacial surgery (OMFS) visits had the highest proportion (94.4%) of opioid prescriptions, while among the non-invasive opioid-associated dental visits, diagnostic visits had the highest proportion (30.1%) of opioid prescriptions - *(data not shown)*.

Table 2 illustrates the most frequently used CDT codes during invasive opioid-associated dental visits and their respective opioid prescribing rates. Within each invasive visit type, the proportion of procedures linked with an opioid prescription (opioid prescribing rate) were highest for the following procedures: OMFS - D7240 Removal of impacted tooth-complete bony (57%), Endodontics - D3310 Endodontic therapy – anterior (19.4%), Periodontics - D4266 Guided tissue regeneration – resorbable (52.9%), and Implant Services - D6010 Surgical placement, endosteal implant (43.6%).

Overall, the mean days' supply and mean quantity of opioids prescribed following a dental visit was 3.6 days, and 17.5 tablets respectively (Table 3). The mean daily MME dose for opioid prescriptions was 32.1, *equivalent to prescribing 6 tablets of 5mg Hydrocodone per day* (Table 3). The wide variation in the mean dosage and mean duration of opioid prescriptions suggests the presence of outliers. The interpretation of the mean values should therefore be limited to realistic cut-points, as is customary for variables such as height and weight. The median days' supply, median quantity prescribed, and median daily MME dose (*data not shown*) were 3 days (Interquartile range (IQR): 2 days), 16 tablets (IQR: 8 tablets), and 30 (IQR: 20) respectively.

The mean duration (4.2 days) and dosage (18.3 tablets) of opioid prescriptions for non-invasive visits were significantly higher than those for invasive visits. Among the non-

[3]Note: Percentage points (pp) denote the arithmetic or absolute difference between two percentages, rather than the relative difference. For example, a 50% increase above a baseline of 50% is 75%. In contrast a 50-percentage point increase above a baseline of 50% is 100%.

invasive opioid-related dental visits, preventive visits had the highest mean number of days' supply (9.1 days) and mean quantity prescribed (27.2 tablets). Restorative visits had the highest mean daily MME dose (35.2). Similarly, visits where beneficiaries had a history of prior high risk prescription use had significantly higher mean days' supply (4.3 days), mean quantity prescribed (19.5 tablets), and mean daily MME doses (33.6) compared to visits for those without this history (Table 3).

Factors Associated with Opioid Prescriptions Following Dental Visits:

Table 4 presents the logistic regression model showing the probability of an opioid prescription following a dental visit controlling for age, gender, race, coverage type, eligibility for Medicaid expansion, prior high risk prescription use, and visit type. The probability of having an opioid prescription following a dental visit was significantly higher when beneficiaries were younger (aged 18-39 years), female, and under managed care coverage (Table 4).

The probability of having an opioid prescription following a dental visit was 35.6 percentage points[4] (pp) (95% CI: 35.3-35.8 pp) higher when the visit was invasive compared to non-invasive visits (Table 4). Similarly, the probability of having an opioid prescription following a dental visit was 11.1 percentage points (pp) (95% CI: 10.9-11.4 pp) higher for visits where beneficiaries had a history of prior high risk prescription use than for visits where beneficiaries didn't have this history. Further, we assessed the interactions between the invasiveness of the visit and a beneficiary's prior high risk prescription use status. This interaction was significant, meaning that the probability of having an opioid prescription for a visit that was both invasive and for a beneficiary with a history of prior high risk prescription use, was 14.3 percentage points (95% CI: 13.6; 14.9 pp) higher than if the visit was non-invasive and the beneficiary didn't have that history (eTable 2).

Discussion

Four main findings readily emerge from this study: 1) Opioid prescriptions were associated with a minority of dental visits; 2) Although opioid-associated dental visits were predominantly invasive, one-third of them were associated with non-invasive visits; 3) The dosage and duration of opioid prescriptions following non-invasive visits were significantly higher and more variable than for invasive visits; and 4) The likelihood of having an opioid prescription following a dental visit increased significantly when the visits were invasive and for beneficiaries with a history of prior high risk prescription use. The results of this study reveal the opioid prescribing patterns following dental visits among Washington State Medicaid beneficiaries in 2014 and 2015, prior to the rollout of recent major state and nation-wide opioid policy initiatives. It serves as a baseline from which to judge the effectiveness of these interventions and provides a roadmap for the development of future interventions for this population.

[4]Note: Percentage points (pp) denote the arithmetic or absolute difference between two percentages, rather than the relative difference. For example, a 50% increase above a baseline of 50% is 75%. In contrast a 50-percentage point increase above a baseline of 50% is 100%.

In the state of Washington, over half a million patients receive opioid prescriptions every quarter,[51] and there are more than 400 opioid-related overdose deaths every year.[52] Much like the rest of the US, Washingtonians have been deeply impacted by the opioid epidemic[53-56], however, the state has aggressively pursued several strategies to combat this epidemic, such as, developing opioid prescribing guidelines[57-59], and passing relevant legislations.[60] Dentists are subject to these state guidelines and legislations, however, they have been relatively understudied in this state, despite their demonstrated contributions to the opioid epidemic nationwide.[3,61]

Over our two-year study period, opioid prescriptions were associated with 10.3% of dental visits by the adult Medicaid population in Washington State. This far exceeds the 2.8% of all dental visits associated with an opioid prescription in a recent study of the Medical Expenditure Panel Survey (MEPS) data.[43] It also confirms previous documentation in the scientific literature that Medicaid beneficiaries tend to receive a higher amount of opioid prescriptions compared to their privately insured counterparts or the general population.[62] Furthermore, the proportion of dental-associated opioid prescriptions to the Washington State Medicaid population might be even greater than 10.3%, if prescriptions by non-dental professionals for dental conditions (such as in the ED) are also considered. An analysis of Medicaid claims data (2013-2015) from 13 states found that 23% of patients filled an opioid prescription within 14 days of their dental diagnoses; however, non-dental health professionals (e.g. ED physicians) wrote significantly more opioid prescriptions for dental diagnoses compared to dentists (Odds ratio: 4.66; 95% CI: 4.59-4.74).[63] The findings from these studies underscore the importance of recent policy initiatives recommending continuing education about safe opioid prescribing for acute and post-procedural dental pain.[28]

While a prescription for an opioid may be warranted when performing invasive procedures, opioids are rarely ever needed for non-invasive dental procedures and not recommended as the first line of treatment for acute dental pain unless there are contra-indications for non-steroidal anti-inflammatory drugs (NSAIDs).[58,64,65] Our study revealed that over one-third of all opioid prescriptions were associated with non-invasive dental visits. This is similar to findings among privately-insured patients where 31% of all prescribed opioids were associated with ‘non-surgical’ dental visits[13]. Among these non-invasive visits, diagnostic visits (30.1%) had the highest proportion of opioid-associated dental visits. The MEPS study discussed above also found that diagnostic visits accounted for a significant proportion of opioid prescriptions, immediately after the top four invasive visit types (Endodontics, Periodontics, Oral and Maxillofacial Surgery, and Implants).[43] Further investigation in the Medicaid population is warranted to examine if these opioid prescriptions associated with non-invasive visits were pre-procedural[13] (*to alleviate pain pending definitive treatment*), or palliative (to placate patients whose definitive treatments aren’t covered by their dental benefits or are reimbursed at lower rates, and those who have undiagnosed chronic conditions such as orofacial pain). If subsequent studies reveal that opioid prescriptions are being used in a palliative manner, it raises an important policy question about the impact of adult Medicaid dental benefits (or lack thereof) on the opioid epidemic.

It is interesting to note that D7240 (Removal of impacted tooth-complete bony), D3310 (Endodontic therapy – anterior), D4266 (Guided tissue regeneration – resorbable), and D6010 (Surgical placement, endosteal implant) were the procedures with the highest opioid prescribing rate within each invasive visit type. While these codes are unsurprising due to their known complexity, the scientific literature[3,13,64,65,70-72] recommends that dentists explore alternative strategies, such as preemptive NSAIDs, long-acting local anesthetics, and corticosteroids, in order to reduce the need for opioid prescriptions in these types of cases, given the known side effects of opioids.[67] Innovative strategies for reducing the reliance on opioid prescriptions following dental visits in these complex cases, often used as a way to prevent the most severe outcomes (worst-case scenarios) which only occur in a handful of cases, need to be further explored in new opioid policy initiatives.[67]

The mean daily MMEs in our sample of Medicaid beneficiaries do not appear to exceed prevailing CDC recommendations of ≤90 MMEs per day for immediate-release opioids,[35,68,69] however, the mean days' supply for most visit types exceeded the recommended Washington state dental prescribing guidelines of no more than 2-3 days duration for acute dental pain.[58] This again underscores the need for the developments of these prescribing guidelines and for continuing education on safe opioid prescribing following dental visits, especially for non-invasive visits. As our study data pre-dates the implementation of these guidelines and opioid policy initiatives, future research would reveal the level of adherence to these opioid-prescribing guidelines, and shed more light on the root causes of the variability in the dosage and duration of opioid prescriptions following dental visits.

Lastly, our data revealed an increased likelihood for opioid prescriptions being associated with visits by beneficiaries who had a history of prior high risk prescription use compared to those without this history. Recent ADA policies as well as state and federal efforts have emphasized the importance of using PDMPs to minimize 'opioid shopping'. As dentists have been documented to utilize PDMPs sparingly[26] unless it is made mandatory, [27] concrete efforts need to be taken to encourage its utilization by dentists, to identify patients with a history of high risk prescription use. Furthermore, there needs to be better system interoperability between medical and dental EHRs so that dentists can have access to their patients' current medication lists and medical histories, in order to prevent being manipulated by opioid shoppers.

Limitations:

To our knowledge, this is the first study of Medicaid beneficiaries that has linked dental claims with PDMP dispense data. While this study has many strengths, our findings are limited to one state so, further research is needed to make it generalizable to all Medicaid beneficiaries. Second, the study period (2014 and 2015) predates most of the recent state and nation-wide opioid policy initiatives, therefore prescribing patterns described do not necessarily reflect current practices in Washington State. Third, it is possible that opioid prescriptions were misattributed to dental visits if patients had other medical services coinciding with the dental visit. We also did not distinguish between pre-procedural and post-procedural opioid prescriptions, or examine concurrent opioid prescriptions, which might be of interest to some researchers.

Conclusion

This study provides a baseline for opioid prescribing patterns following dental visits among the Washington State Medicaid population in 2014 and 2015. Opioid prescriptions were associated with a minority of dental visits, most of which were invasive and for beneficiaries with a history of prior high risk prescription use. The likelihood of an opioid prescription following a dental visit increased with these two factors indicating that dentists need to exercise caution when prescribing opioids during invasive visits and to patients with prior high risk prescription use. Future studies need to examine the impact of recent policies on opioid prescribing patterns, and the reasons for the variability in the dosage and duration of opioid prescriptions associated with non-invasive visits.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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EO, EM, UM, ES and BCS developed the study question. BCS obtained funding. NLM and CJC managed the data, performed all the analysis, and wrote the methods section. EO and UM prepared the initial draft of the manuscript, and all authors made substantial edits and revisions. The final version of the manuscript was approved by all the authors.

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Table 1.

Distribution of Beneficiary and Visit Characteristics For All Dental Visits

	All Visits - *N (%)*	Visits w/ Opioids - *N (%)*	Visits w/out Opioids - *N (%)*
Total	**1,230,618 (100)**	**126,660 (10.3)**	**1,103,958 (89.7)**
Age			
18-39	732,213 (59.5)	76,604 (60.5)	655,609 (59.4)
40-65	495,605 (40.3)	49,918 (39.4)	445,687 (40.4)
65+	2,800 (0.2)	138 (0.1)	2,662 (0.2)
Gender (Female)	769,542 (62.5)	77,219 (61.0)	692,323 (62.7)
Race/Ethnicity			
White	661,965 (53.8)	84,327 (66.6)	577,638 (52.3)
Hispanic	240,745 (19.6)	13,423 (10.6)	227,322 (20.6)
Black	98,304 (8.0)	11,404 (9.0)	86,900 (7.9)
American Indian/Alaska Native	37,667 (3.1)	5,657 (4.5)	32,010 (2.9)
Asian/ Native Hawaiian/Pacific Islander	94,263 (7.7)	4,263 (3.4)	90,000 (8.2)
Other	48,739 (4.0)	3,949 (3.1)	44,790 (4.1)
Unknown	48,935 (4.0)	3,637 (2.9)	45,298 (4.1)
Coverage Type			
Managed care	1,102,964 (89.6)	117,098 (92.5)	985,866 (89.3)
Fee-for-service	127,654 (10.4)	9,562 (7.5)	118,092 (10.7)
Eligible for Medicaid under Expansion	465,581 (37.8)	47,839 (37.8)	417,742 (37.8)
Visit Type			
Invasive	200,166 (16.3)	84,708 (66.9)	115,458 (10.5)
Non-invasive	1,030,452 (83.7)	41,952 (33.1)	988,500 (89.5)
High Risk Status *			
Yes	179,693 (14.6)	42,964 (33.9)	136,729 (12.4)
No	1,050,925 (85.4)	83,696 (66.1)	967,229 (87.6)

* "Prior high risk prescription use" is defined as beneficiaries with: More than 3 prescribers within 12 months; More than 4 controlled substance II-V prescriptions within 12 months; More than 2 controlled substance II-V prescriptions within last 40 days; Any prescription for Methadone, Suboxone, Fentanyl Transdermal, Long-acting Morphine, or Long-acting Oxycodone within last 6 months; Any overlapping prescriptions for Narcotics (controlled substance II-V) and Benzodiazepines within last 6 months; More than 100 average MME/day (Morphine Milligram Equivalent/day) prescribed within last 40 days

Table 2:

Opioid Rx Rate for the Most Frequent CDT Codes Used in Invasive Dental Visits, by Dental Specialty

CDT	Description	Total Count	Opioid Rx Rate
Oral and Maxillofacial Surgery (OMFS) (D7000 – D7999)			
D7240	Removal of impacted tooth-complete bony	10101	57.0
D7230	Removal of impacted tooth-partially bony	9817	55.6
D7210	Surgical removal of erupted tooth	75912	53.3
D7220	Removal of impacted tooth soft tissue	6114	50.9
D7140	Extraction erupted tooth or exposed root	99464	39.5
Endodontics (D3000 – D3999)			
D3310	Endodontic therapy - anterior	9409	19.4
D3220	Therapeutic pulpotomy	256	17.6
D3221	Pulpal debridement, prim/perm	5778	16.3
D3320	Endodontic therapy - bicuspid	1390	14.6
D3330	Endodontic therapy - molar	1918	12.1
Periodontics (D4000 – D4999)			
D4266	Guided tissue regeneration - resorb	34	52.9
D4263	Bone replacement graft 1st site per quad	47	42.6
D4249	Crown lengthen, hard tissue	36	30.6
D4211	Gingivectomy/plasty - 1-3 teeth	68	14.7
D4267	Guided tissue regeneration-non-resorbable	57	8.8
Implant Services (D6000 – D6199)			
D6010	Surgical placement, endosteal implant	78	43.6

*Limited to procedures with a total count ≥20; Rx: Prescription

Table 3:

Dosage and Duration of Opioid Prescriptions Following Dental Visits by Visit Type and Prior High Risk Prescription Use

	Day's Supply Mean (SD)	Quantity Prescribed Mean (SD)	Daily MME Mean (SD)	P-Value
Overall	**3.6 (3.6)**	**17.5 (13.1)**	**32.1 (16.0)**	
Visit Type				**<0.05**
Invasive Procedures	**3.4 (2.3)**	**17.1 (9.5)**	**32.8 (15.4)**	
Endodontics	3.1 (2.9)	15.8 (12.1)	32.0 (16.1)	
Periodontics	2.6 (0.8)	13.3 (4.5)	31.5 (14.1)	
OMFS	3.4 (2.3)	17.1 (9.3)	32.8 (15.3)	
Implants	2.8 (0.8)	15.9 (3.5)	31.8 (7.3)	
All other invasive procedure combinations	3.1 (1.6)	16.9 (10.8)	34.2 (15.5)	
Non-invasive Procedures	**4.2 (5.3)**	**18.3 (18.3)**	**30.6 (17.1)**	
Endodontics	6.0 (12.2)	23.0 (27.8)	32.3 (17.0)	
Periodontics	6.3 (8.9)	26.8 (31.9)	32.0 (18.5)	
Implants	3.0 (N/A)	20.0 (N/A)	33.3 (N/A)	
Diagnostic	3.8 (4.4)	18.7 (16.4)	35.0 (18.5)	
Preventive	9.1 (11.3)	27.2 (22.3)	34.0 (20.0)	
Restorative	5.2 (7.6)	22.7 (25.4)	35.2 (21.5)	
All other non-invasive procedure combinations	4.2 (5.4)	17.5 (17.8)	28.3 (15.5)	
High Risk Status *				**<0.05**
Yes	4.3 (5.6)	19.5 (19.2)	33.6 (18.6)	
No	3.3 (1.8)	16.5 (8.1)	31.2 (14.4)	

SD=Standard Deviation; MME: Milligram Morphine Equivalent

* "Prior high risk prescription use" is defined as beneficiaries with: More than 3 prescribers within 12 months; More than 4 controlled substance II-V prescriptions within 12 months; More than 2 controlled substance II-V prescriptions within last 40 days; Any prescription for Methadone, Suboxone, Fentanyl Transdermal, Long-acting Morphine, or Long-acting Oxycodone within last 6 months; Any overlapping prescriptions for Narcotics (controlled substance II-V) and Benzodiazepines within last 6 months; More than 100 average MME/day (Morphine Milligram Equivalent/day) prescribed within last 40 days

Table 4:

Adjusted Predictors of Opioid Prescriptions Following Dental Visits

Covariate	Marginal Effect Estimate	[95% Conf. Interval]	
Age			
18-39	ref		
40-65	−0.021	−0.022	−0.020
65+	−0.048	−0.057	−0.039
Gender			
Male	ref		
Female	0.002	0.001	0.003
Coverage Type			
Managed Care	ref		
Fee-for-service (FFS)	−0.022	−0.024	−0.021
Eligible for Medicaid under Expansion			
No	ref		
Yes	0.000	−0.001	0.002
Race/Ethnicity			
White	ref		
Black	0.002	−0.001	0.004
Hispanic	−0.038	−0.039	−0.036
Asian/Native Hawaiian/Pacific Islander	−0.049	−0.051	−0.047
American Indian/Alaskan Native	0.023	0.018	0.027
Other	−0.020	−0.024	−0.017
Missing	−0.025	−0.029	−0.022
High Risk*			
No	ref		
Yes	0.111	0.109	0.114
Visit Type			
Non-invasive visit	ref		
Invasive visit	0.356	0.353	0.358

“Prior high risk prescription use” is defined as beneficiaries with: More than 3 prescribers within 12 months; More than 4 controlled substance II-V prescriptions within 12 months; More than 2 controlled substance II-V prescriptions within last 40 days; Any prescription for Methadone, Suboxone, Fentanyl Transdermal, Long-acting Morphine, or Long-acting Oxycodone within last 6 months; Any overlapping prescriptions for Narcotics (controlled substance II-V) and Benzodiazepines within last 6 months; More than 100 average MME/day (Morphine Milligram Equivalent/day) prescribed within last 40 days