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Assessing Changes in Opioid Prescribing Habits of U.S. Army Dental Corps Providers Following Completion of Opioid Prescriber Safety Training

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Introduction

On October 21, 2015, the White House released a Presidential Memorandum addressing the need to reduce prescription pain medication and heroin overdose deaths by ensuring medical professionals receive adequate training and improving access to medication-assisted treatment therapies[1]. The opioid public health crisis pervades into both military and civilian populations[2]. Nearly 12.5 million people misused opioids in 2015 and overdose was associated with 33,091 deaths[3]. Misuse is defined as use of an opioid for reasons other than pain, use of an old opioid prescription for new reason or use of more medication than prescribed[4]. Balancing management of pain with patient desires and mitigating the risk of promoting opioid misuse is a professional challenge all health care providers face. The U.S. Armed Services are vulnerable to negative impacts of opioid misuse and abuse for a variety of reasons. It is the responsibility of Dental Corps providers to fully consider the impact of opioids on our patient population and organizational readiness when making clinical decisions regarding the prescription of narcotics.

Dental providers are one of the most common sources of prescriptions for immediate release opioids. Dentists prescribe approximately 12 percent of all opioids in the United States, second to family physicians who prescribe 15 percent of immediate release opioids.[4] The average number of opioid prescriptions in 2015 per 1,000 patients was 147.44 with 68.41% being for surgical dental visits.[5] Extraction of third molars, commonly referred to as wisdom teeth, is commonly associated with prescription for an immediate release opioid. Every year, nearly 3.5 million young adults in the United States undergo surgical extraction of third molars.[6] Even though 73.5 percent of oral and maxillofacial surgeons surveyed by Moore et al., stated that peripherally acting NSAIDS were the preferred analgesic, approximately 85.0% concurrently prescribed an opioid.[7] The most commonly prescribed medication following third molar surgery was hydrocodone with acetaminophen at a dispense dosage of 20 pills.[8] Crucial to combating the rising opioid epidemic is recognizing our place, as an oral health team, in the crisis.

Excess medications following treatment are a major concern organizational concern. One study found that 54 percent of opioids prescribed for dental procedures were not used, with patients having, on average 15 of 28 prescribed opioid pills remaining.[9] This is of particular concern in an organization with an inherent tribe mentality. The majority

of opioids obtained for non-treatment seeking persons were from friends and family with legitimate prescriptions.[10] In a 2008-2009 survey of students 12 years and older, researchers found that 55.3% obtained the drugs for free from a family member or friend with a legitimate prescription, 9.9% bought them from a friend or family member and 5.0% took them from a friend or family member without their consent.[11] The underlying motivation for opioid diversion appears to be a desire to help address symptoms of pain or physical discomfort rather than a desire to enable inebriation.[12]

The dynamic work environment and professional expectations placed on U.S. servicemembers places them at an increased risk for opioid misuse. Opioids are intended to treat moderate to severe pain.[13] In a survey of 2,597 U.S. Soldiers redeploying from Iraq and Afghanistan, 15.1% of non-medical treatment seeking Soldiers reported opioid use which is elevated compared to the 4.0% rate seen in the civilian population.[14] Of these opioid users, 44.1% reported no or mild pain and 5.6% reported no pain.[14] Injury in combat is an unfortunate outcome of armed conflicts that may further increase risk of opioid misuse. Prevalence of veterans wounded in combat misusing opioids has been reported as 46.2%.[15] If these injured servicemembers have sustained use of opioids at the time of injury, there is a lower likelihood of discontinuing use later in life.[16] A final concern regarding military readiness is the potential impact of opioids on mental health issues. In a screening of 88,235 US Soldiers, nearly 20.3% of active and 42.4% of reserve component Soldiers reported need for additional mental health treatment following redeployment from Iraq. The potential for opioids to exacerbate mental health disorders is cause for special concern within military populations. Opioid prescriptions for patients with PTSD have been correlated with increased incidence of adverse events.[17] All of these reasons highlight the potential negative impact on military readiness.

On means of addressing this challenge is to examine prescribing habits of military dental providers. Military dental providers are challenged to manage busy clinical schedules to meet productivity requirements, maintain high levels of patient satisfaction and minimize impact of treatment on Soldiers capability to meet mission requirements. Patient satisfaction is often directly associated with effective pain management.[18] Despite evidence that peripherally acting NSAIDs are as effective opioids in addressing pain following surgical third molar extraction, many oral health care providers elect to prescribe analgesics that are capable of addressing the patient with the most painful recovery.[19, 20] One option is to integrate strict protocols for opioid prescriptions. Post-operative prescribing protocols have demonstrated success in reducing opioid prescriptions by over 25 percent following third molar extractions.[21] Another option is to assess how we educate providers early in their career. Integration of postoperative pain control practice education and specific opioid prescription training both demonstrated significant reduction on opioid prescriptions.[22, 23] Over 50 percent of residents believed

they prescribed more narcotics than the patient needed, citing attending preference as the largest influence on prescribing habits.[23]

The 2015 Presidential Memorandum required all federal healthcare providers who prescribe controlled substances complete training on appropriate and effective prescription of opioid medications within no more than 18 months with refresher training required every three years. Organizational commitment, such as this, has been demonstrated to significantly influence motivation to learn with regards to mandatory training.[24] The training provided to the military was the Department of Defense Opioid Prescriber Safety Training Program with the aim to equip providers with necessary information to improve patient outcomes for substance use disorders and pain management. The training was deployed in an online format consisting of two 1-hour modules. The first module was Pain Management and Opioid Prescribing Safety and the second was titled Opioid Prescribing Safety – Do No Harm. Training had to be completed by no later than April 20, 2017.

The intent of this study is to investigate if there exists identifiable differences in U.S. Army Dental Corps Officers opioid prescribing habits following the mandatory training. Furthermore, we will describe rates of opioid prescriptions for different dental areas of concentration in the Army and examine any differences existing between AOCs and genders.

Methods & Design

Data was queried from M2 (Miliary Health System Mart) utilizing the following the Pharmacy Data Transaction Service (PDTS) table, National Provider Identification (NPI) table, and Direct Care Dental (DCD) table. Date range queried was July 15 -October 15, 2015 and July 15 – October 15, 2017.

PDTS table receives it source data from patient level information as reported by the dispensing military treatment facility, mail order pharmacy, or retail pharmacies. PDTS also includes VA fills. Utilized PDTS table to query data in therapeutic class code 280808, opiate agonists, where the MEPRS1 Code Ordering Site was equal to “C” (Dental), the Ordering Site Military Service was equal to “A” (Army) and the CY (Calendar Year) and CM (Calendar Month) matched requested time periods. The following fields were requested as results: CY, CM, Pseudo Person ID, Provider ID, Issue Date, Ordering Site Name, Product Name, Quantity Dispensed and Therapeutic Class.

The NPI table receives its data from CMS NPPES Table and DMHRS HR Basic File. The requested fields were Healthcare Provider Taxonomy and Gender. The DCD table receives its source data from Corporate Dental System (CDS). DCD stores procedure level record information for all Army, Air Force and most Navy treatment facilities. The

DCD was used for two queries. The first query pulled record IDs equal to Pseudo Person ID from the PDTS query and the encounter date matched the issue date from the PDTS query. The requested fields were record ID and number of services. The second query utilized the record ID from the first query to gather calendar year, calendar month, provider type, pseudo person ID, treatment DMIS name, encounter date, procedure code and number of services. The data was exported to Excel and merged based on pseudo patient ID, encounter date and issue date. We selected all dental patient encounters for timeframes July 15, 2015 to October 15, 2105 and July 15, 2017 to October 15, 2017 that had an associated opioid agonists.

The present study queried U.S. Army soldiers' electronic health records for encounters with dental providers during which an opioid was prescribed. To assess the impact of opioid awareness training on provider habits, de-identified records from July through October of 2015 and 2017 were assessed for prescriptions containing opioids. Due to de-identification of the query results, no effort was made to reduce the output by patient. Thus, the results reflect the total number of opioid prescriptions issued by dental professionals not the number of patients.

Each provider's specialty and gender and were also collected for analysis as was the month and year of the encounter, the dental treatment code, medication name, and quantity dispensed. Dental providers who's specialty was listed as dental public health (n=2) or pediatric dentistry (n=12) were removed from the sample prior to analysis. Additionally, providers who's specialty was not listed were removed (n=51).

Summary statistics are provided for categorical variables. The chi-square goodness of fit test was used to assess the efficacy of training in reducing the total number of opioid prescriptions issued by dental providers. The Kolmogorov-Smirnov test was used to compare monthly distributions of prescriptions. The Kruskal-Wallis test was used for multiple comparisons of sample characteristics. Chi squared tests of independence were used for other pairwise comparisons. The phi coefficient is provided as a measure of effect size for binary variable pairs to provide context to significant results. Significance was declared at $P < 0.05$ for all tests. All data were analyzed by using SPSS version 25.0 (SPSS, Chicago, IL).

Results

Between July and October of 2015, US Army dental providers prescribed 10,383 medications containing opioids. By 2017, the frequency of opioid prescriptions during that same period had dropped 17.4% to 8,577 ($P<0.001$, $\varphi=0.14$). The total number of opioid prescriptions (n=18,960) by month are shown in figure 1. Although prescriptions declined overall, it is worth noting that the distribution also changed. Proportionally there was no change in the rate of prescriptions from 2105 to 2017 for the months of July, September, and October ($P>0.05$). However, a significant post-training increase was noted for the month of August, $P<0.001$.

Figure 1.

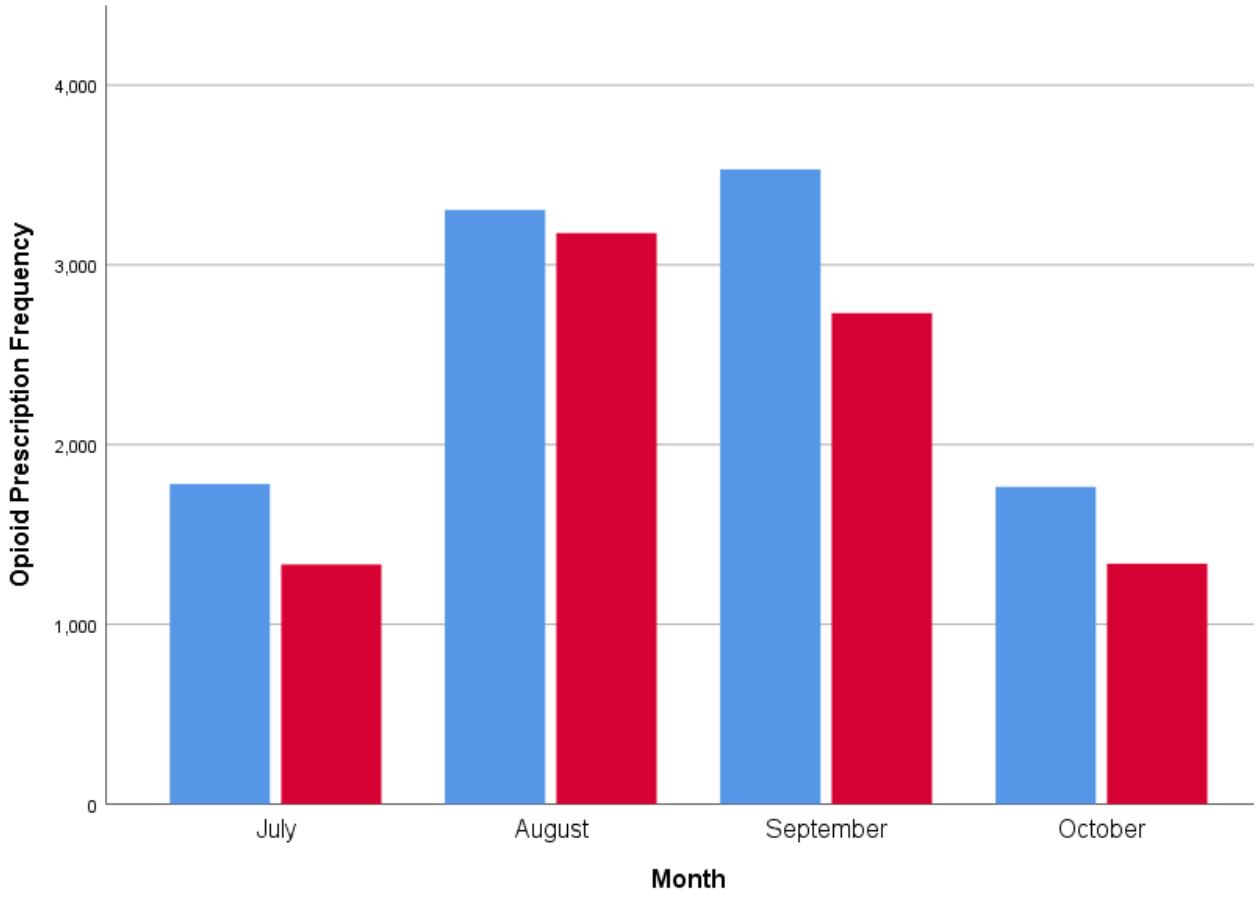

Table 1 shows the gender and dental specialty characteristics of the prescribing dental providers by year. No difference in gender distribution was noted between the sample years, *P*=0.25. Looking at the different specialties, general dentists and prosthodontists decreased their prescription of opioids on both a frequency and percentage basis from 2015 to 2017. Oral and maxillofacial surgical dentists saw a drop in total number of opioid prescribed but an increase as a percentage of prescribing dental providers from 11.3% to 12.4%. Unexpectedly, Periodontist and Endodontists increased from 2015 to 2017 both on a frequency and percentage basis. In 2015, Periodontists prescribed 59 (0.6%) of the opioids resulting from dental procedures. By 2017 that number had more than tripled to 183 prescriptions (2.1%). Although Endodontists also increased their use of opioids from 61 in 2015 to 64 in 2017, the increase was not significant and thus can be considered as no change (*P*>0.05).

Table 1. Sample Characteristics

	2015		2017		*P* [§]
	n	%	n	%	
Gender					
Male	8,613	83.0	7,060	82.3	0.25
Female	1,770	17.0	1,517	17.7	
Specialty					
General dentist	9,038	87.0	7,248	84.5	
Oral and Maxillofacial Surgery	1,177	11.3	1,063	12.4	
Periodontics	59	0.6	183	2.1	<0.001
Endodontics	61	0.6	64	0.7	
Prosthodontics	48	0.5	19	0.2	

The frequencies of dental procedures codes resulting in the prescription of an opioid are shown in Table 2. Data show that the most frequent procedure resulting in such a prescription was the extraction or removal of a tooth (n=15,772) followed by surgical placement of an implant (n=805). These data exclude diagnostic codes (D0100-D0999), preventative procedure codes (D1000-D1999), and adjunctive general service codes (D9000-D999) such as “oral hygiene instructions” (D1330) and “limited oral evaluation” (D0140).

Table 2. Frequency of Dental Procedures Codes for which an Opioid was Prescribed [§]

Procedure Code	Description	Frequency
D7140	Extraction, erupted tooth or exposed root	4,773
D7210	Extraction, erupted tooth requiring removal of bone and/or sectioning of tooth	3,495
D7230	Removal of impacted tooth - partially bony	2,877
D7240	Removal of impacted tooth - completely bony	2,823
D7220	Removal of impacted tooth - soft tissue	1,804
D6010	Surgical placement of implant body: endosteal implant	805

[§] Excludes diagnostic codes (D0100-D0999), preventative codes (D1000-D1999), and code for adjunctive general services (D9000-D999).

The exact opioid containing prescriptions are shown in Table 3 by year and gender. Although there was an overall decrease in opioid use during the sample period from, the rates of the top three most frequently prescribed drugs did not differ, *P*=0.12.

Table 3. Opioids prescribed by dental providers by year

Medication Name	2015				2017				Total	
	Men		Women		Men		Women			
	n	%	n	%	n	%	n	%	n	%
Acetaminophen / Oxycodone	5,608	65.1	1,184	66.9	4,577	64.8	1,051	69.3	12,420	65.5
Acetaminophen / Hydrocodone	2,610	30.3	452	25.5	2,049	29.0	354	23.3	5,465	28.8
Acetaminophen / Codeine	218	2.5	88	5.0	219	3.1	58	3.8	583	3.1
Tramadol hydrochloride	44	0.5	13	0.7	49	0.7	51	3.4	157	0.8
Oxycodone Hydrochloride	38	0.4	5	0.3	111	1.6	3	0.2	157	0.8
Codeine sulfate	29	0.3	0	0.0	51	0.7	0	0.0	80	0.4
Meperidine hydrochloride	29	0.3	18	1.0	1	0.0	0	0.0	48	0.3
Hydrocodone / Paracetamol	31	0.4	9	0.5	0	0.0	0	0.0	40	0.2
Hydromorphone Hydrochloride	3	0.0	1	0.1	1	0.0	0	0.0	5	0.0
Fentanyl	2	0.0	0	0.0	0	0.0	0	0.0	2	0.0
Hydrocodone / Ibuprofen	0	0.0	0	0.0	2	0.0	0	0.0	2	0.0
Morphine Sulfate	1	0.0	0	0.0	0	0.0	0	0.0	1	0.0
Total	8,613	100.0	1,770	100.0	7,060	0.0	1,517	100.0	18,960	100.0

Discussion

This study demonstrated a decrease in the frequency of opioid prescription by oral health care providers in the U.S. Army Dental Corps between 2015 and 2017. Following a 2015 Presidential Memorandum, Federal health care providers that prescribe controlled substances were required to complete training to address best practices for appropriate and effective prescribing of pain medications, principles of pain management, the misuse potential of controlled substances, identification of potential substance use disorders and referral to further evaluation and treatment, and proper methods for disposing of controlled substances.[1] Providers had until April 20, 2017 to complete the training.

It would be inappropriate to contribute the decrease in opioid prescription frequency in the studied population to completion of a mandatory training. Though previous studies have demonstrated a correlation between provider training and reductions in opioid prescription frequency, there are numerous confounding variables that limit the observed changes being associated with training. Societal awareness of the opioid crisis has increased coupled with increased news media coverage of the socioeconomic and health impacts of opioid misuse. Furthermore, there has been an increase in the development and implementation of opioid prescribing guidelines in healthcare facilities. Further research is needed to elucidate the impact of the identified mandatory training on prescribing habits.

The decrease in prescriptions for this study was proportional for months July, September and October. The decrease in frequency for the month of August was proportionally less, suggesting that variations in the underlying population might be associated with prescription frequency. This further clouds the association between completion of mandatory training and changes in prescribing behavior. Amongst genders, there was a uniform reduction in opioid prescription frequency. Males accounted for greater than 80% of opioid prescriptions during both time windows monitored. At this time, the gender distribution for providers in the U.S. Army Dental Corps was not available. The gender difference in frequency encourages further research to investigate if there is a correlation between male gender and more aggressive opioid analgesic utilizations.

This study represents the first survey of opioid prescription habits within the U.S. Army Dental Corps. The study provides epidemiologic data for different dental specialties, genders, procedures associated with an opioid prescription and which frequency with which different opioids are prescribed. This data set is useful background for driving further research into the influencers of provider habits and the long-term organizational changes in opioid utilization for control of dental pain.

Conclusion

This study demonstrates that the frequency of opioid prescriptions written by U.S. Army Dental Corps Officers from July 15, 2017 to October 15, 2017 was 17.4% lower than the prescription frequency for the same time period in 2015. Frequency decreased from 10,383 in 2015 to 8,577 in 2017. The most common procedure associated with an opioid prescription is extraction of a tooth followed by surgical implant placement. The most commonly prescribed opioids are combinations with acetaminophen with acetaminophen/oxycodone accounting for nearly 65% of all opioid prescriptions.

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