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OPIOID PRESCRIPTION RATE BY MILITARY DENTISTS IN FORT BRAGG, NC 2009-2018

BY

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D.M.D. University of Pennsylvania – 2016

Submitted in partial fulfillment of the requirements for the degree of Master of Science in the Department of Oral Biology in the Uniformed Services University of Health Sciences

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2020

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DISCLOSURE

The opinions or assertions contained herein are the private ones of the author(s) and are not to be construed as official or reflecting the view of the DoD or the USUHS. CPT Tania Sanchez, DMD, is a resident of the Army Postgraduate Dental School and Uniformed Services University of the Health Sciences Postgraduate Dental College.

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ABSTRACT

Background: Opioid overuse is a public health concern in the United States and affects both the civilian and military population. The Military Health System have showed and increased in opioid prescriptions in service members returning from deployment. Fort Bragg is the largest military installation in the world, and has the most frequently deployed units in the Army. There are limited studies describing opioid prescription rates by dentists, despite the fact that it has been estimated that dentists prescribe 11% of the overall annual number of opioid prescriptions in the US, the second highest prescribers after family physicians.

Purpose: The purpose of this study was to evaluate the opioid prescription data of dentists assigned to Fort Bragg, NC during the period of time between January 2009 and December 2018.

Methods: De-identified records from January 2009 to December 2018 were assessed for prescriptions containing opioids. Prescription data was obtained from electronic military health records of patients treated by dental providers on Fort Bragg, NC.

Results: Over the ten years we examined, 46,884 prescriptions containing opioids were issued by dental providers on Fort Bragg. As expected in a military population, the majority (n = 36,545; 77.9%) of prescriptions were written for men with women receiving only 22.1% (10339), P<0.001. Most opioids were prescribed for middle aged individuals (Mdn 39; IQR 32-46). The previous ten years have included a statistically significant decline in the yearly number of opioid prescriptions issued by the dental community on Fort Bragg, $P < 0.001$. Within years, seasonal differences in prescribing habits were also noted, $P < 0.001$. The fewest number of opioid medications were prescribed in December (n = 3427); a significant decrease from the months preceding and following it. Similarly, March showed the highest number of prescriptions (n = 4464); significantly higher than February (n = 4011) or April (n = 4094).

Conclusions: Although dentists prescribe opioids for the treatment of post-operative pain, and for a short period of time, opioid prescribing education for both dentists and patients could minimize the risk of opioid abuse problems. Opioid prescriptions should be reserved for situations where moderate-severe pain is anticipated, and alternative medications like NSAIDs employed for the management of mild post-operative pain. Additionally, dentists should remain vigilant to identify at risk patients for opioid abuse problems.

INTRODUCTION

Abuse and addiction to opioids including prescription painkillers, heroin, and synthetic opioids such as fentanyl constitutes a serious national crisis that affects both public health and economic wellness. According to the National Institute on Drug Abuse, more than 130 people in the United States (US) die every day from an overdose of opioids (1) (3). The CDC estimates that in the US the total economic burden derived from the abuse of prescription opioids is $78.5 billion per year. This includes the costs of medical care, loss of productivity, treatment of addiction, and the costs of intervention of the criminal justice system (7).

There are limited studies describing opioid prescription rates by dentists, despite the fact that it has been estimated that dentists prescribe 11% of the overall annual number of opioid prescriptions in the US (5), the second highest prescribers after family physicians (6). They are among the practitioners from whom substance abusers seek prescriptions by visiting multiple dental offices to obtained controlled drugs (4). Mutlu and colleagues reported that most American oral and maxillofacial surgeons prescribe an appropriate dose of pain control drugs, 20 tablets being the most common prescription. However, 80 out of the 384 participants of this study (22%) prescribed more opioids than what would be considered necessary for pain control post-extraction of third molars (12). The theory that current prescribing protocols following third molar extractions may be excessive was supported by another study that showed only 6 out of 81 patients (7%) took oxycodone during the postoperative period of 7 days with an average of 3.3 tablets per patient after extraction of asymptomatic third molars (14). In an effort to curb the overprescribing of opioids by dentists, the American Dental Association announced a new policy that limits the prescription of opioids and other controlled substances to seven days for the treatment of acute pain, consistent with the Centers for Disease Control and Prevention evidence-based guidelines in the effort to decrease the use, misuse and abuse of these drugs (8).

The mechanism of action of opioid analgesics targets the opiate receptors in the central nervous system and can be successfully used for acute or chronic pain relief. However, the repeated administration can eventually lead to the need for higher doses to obtain the same effect (tolerance), as well as physical and psychological dependence (5).

This problem of increased opioids misuse, abuse, and addiction it is not limited to the civilian population, but also affects members of the US military services. Between 2001 and 2009, opioid prescriptions in the Military Health System quadrupled to 3.8 million with 15.1% of service members returning from deployment reporting opioid use. (10). This data is relevant because Fort Bragg is the largest military installation in the world, and it is the home of the Army's XVIII Airborne Corps, and the United States Army Special Operations Command, which oversee the most frequently deployed units in the Army.

The Department of Defense (DoD) has emphasized high priority in the prevention of chronic pain, opioid use disorders, and post-traumatic stress disorder (PTSD) among

military service members. The correlation between opioid dependence and abuse, and PTSD is unclear. Dabbs et al., discussed the “healthy-warrior-effect” hypothesis, and concluded that service members with one deployment, or no history of deployments, have more risk to develop opioid dependency or abuse when compared with service members with a history of four or more deployments (2). The reason is because Soldiers that deploy frequently are required to have a high level of mental and physical health to maintain their deployable status. However, deployment frequency cannot be solely associated with future opioid dependency or abuse, and other mental and physical factors should be taken into consideration.

The study by Toblin (15) also implied that there is a large unmet need for chronic pain management and treatment, as well as opioid misuse, in military service members after combat deployments. Soldiers reported being prescribed opioids despite reporting mild to even no pain, which violates the recommended use of opioid drugs to manage moderate to severe pain.

Schroeder et al., studied the relationship between opioid prescriptions written by dentists and subsequent opioid abuse in adolescents and young adults aged 16 and 25 years old. They evaluated 754,002 patients in this study, of which 97,462 patients (12.9%) received opioids, and 29,791 (30.6%) received the prescription from a dental provider. They included 14,888 patients in the opioid-exposed group, and randomly selected 29,776 patients for the opioid-nonexposed group. 6.9% of the opioid-exposed group received another prescription within 90-365 days, and 5.8% had a subsequent opioid-related abuse diagnosis compared to 0.1% and 0.4% respectively in the opioid non-exposed patients (16). This study is relevant because most of the third molar extractions in the military are performed in younger Soldiers that can potentially be exposed for the first time to opioids, which may increase their risk to develop future opioid misuse and abuse.

PURPOSE

The purpose of this study was to evaluate the opioid prescription data of dentists assigned to Fort Bragg, NC during the period of time between January 2009 and December 2018.

HYPOTHESIS

There will be an increasing number of opioid prescriptions written by dentists assigned to Fort Bragg, NC.

MATERIALS AND METHODS

The present study queried prescription data from electronic military health records of patients treated by dental providers on Fort Bragg, NC. De-identified records from January 2009 to December 2018 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 receiving such. For each patient, gender and age were also collected for analysis.

Summary statistics are provided for categorical variables and include the number of prescriptions as well as the prevalence. For non-normally distributed continuous data, measures of central tendency are reported as medians with associated interquartile ranges (IQR). Normality of patient age distribution was assessed using the Shapiro-Wilk test. A chi-square test goodness of fit test was used in frequency analysis and a chi squared test of independence was used for pairwise comparisons. The Mann-Whitney test was used to examine continuous variables such as age. Eta squared effect size was calculated for the Mann-Whitney U statistic 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

Over the ten years we examined, 46,884 prescriptions containing opioids were issued by dental providers on Fort Bragg. Although the majority of these prescriptions were issued for oxycodone/ acetaminophen (n = 37,737; 80.5%), 11 categories of opioids were found as shown in Table 1.

As expected in a military population, the majority (n = 36,545; 77.9%) of prescriptions were written for men with women receiving only 22.1% (10339), $P<0.001$. As shown in figure 1, most opioids were prescribed for middle aged individuals (Mdn 39; IQR 32-46). A difference by gender was found among ages of patients receiving opioid containing analgesics ($P < 0.001$), with women (Mdn 40; IQR 33-47) being slightly older than men (Mdn 39; IQR 32-46). However, with an effect size of $\eta^2 = 0.00$ we see that while a large sample allows resolution of small differences in age, there is no practically relevant difference in the age at which patients of different genders received prescriptions. The frequency of opioid containing analgesic prescriptions by age is shown in Figure 1.

Additionally, it is worth noting that 1163 individuals over the age of 65 received an opioid containing analgesic, including 4 centenarians. On the other end of the age spectrum, 148 opioid containing medications were prescribed to individuals below the age of 18, with the youngest being 7 years old. However, no opioid has been prescribed to a minor by a dental provider since 2011.

As Figure 2 shows, the previous ten years have included a statistically significant decline in the yearly number of opioid prescriptions issued by the dental community on Fort Bragg, $P < 0.001$. Within years, seasonal differences in prescribing habits were also

noted, $P < 0.001$. The fewest number of opioid medications were prescribed in December (n = 3427); a significant decrease from the months preceding and following it. Similarly, March showed the highest number of prescriptions (n = 4464); significantly higher than February (n = 4011) or April (n = 4094).

Table 1. Opioids prescribed by dental providers, 2009-2018

Medication Name	Frequency	Percent
Oxycodone / Acetaminophen	37737	80.49
Hydrocodone / Paracetamol	5884	12.55
Codeine / Acetaminophen	2210	4.71
Tramadol	439	0.94
Oxycodone	334	0.71
Hydromorphone HCL	133	0.28
Propoxyphene Napsylate / Acetaminophen	120	0.26
Fentanyl	8	0.02
Oxycontin	8	0.02
Morphine	5	0.01
Hydrocodone / Ibuprofen	6	0.01
Total	46884	100.00

Figure 1. Frequency of Opioid Analgesic Prescriptions by Patient Age

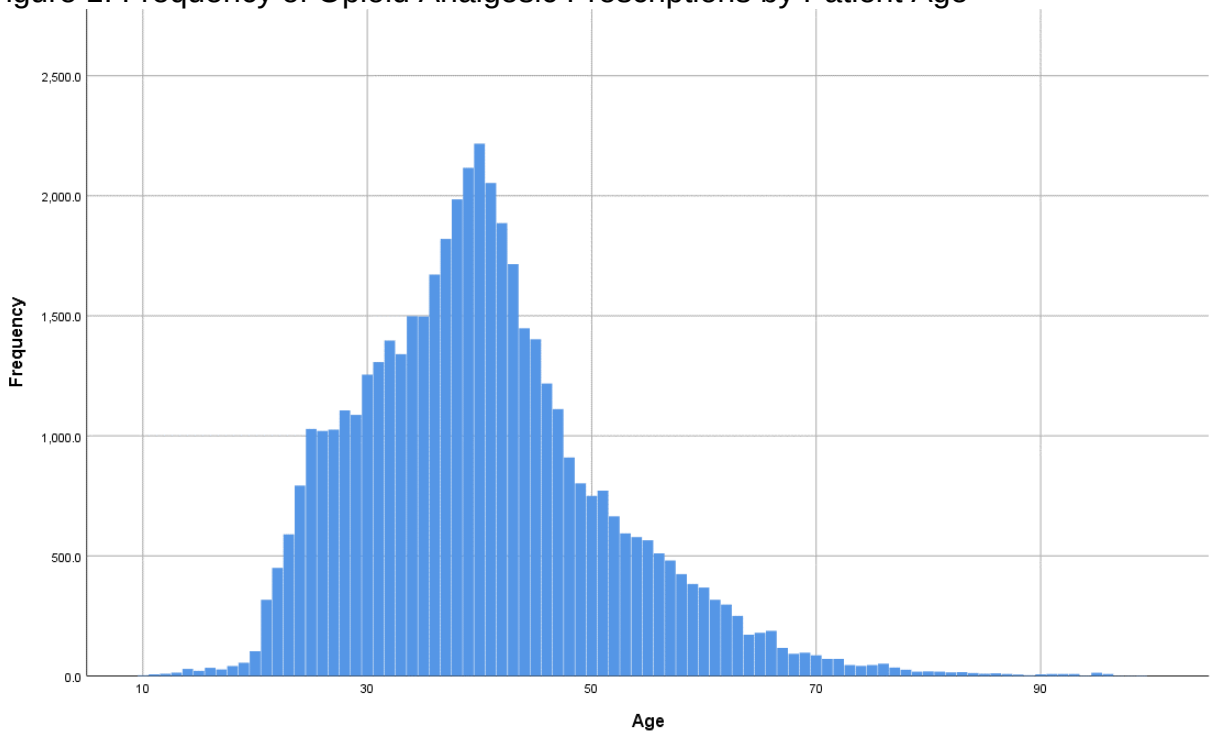
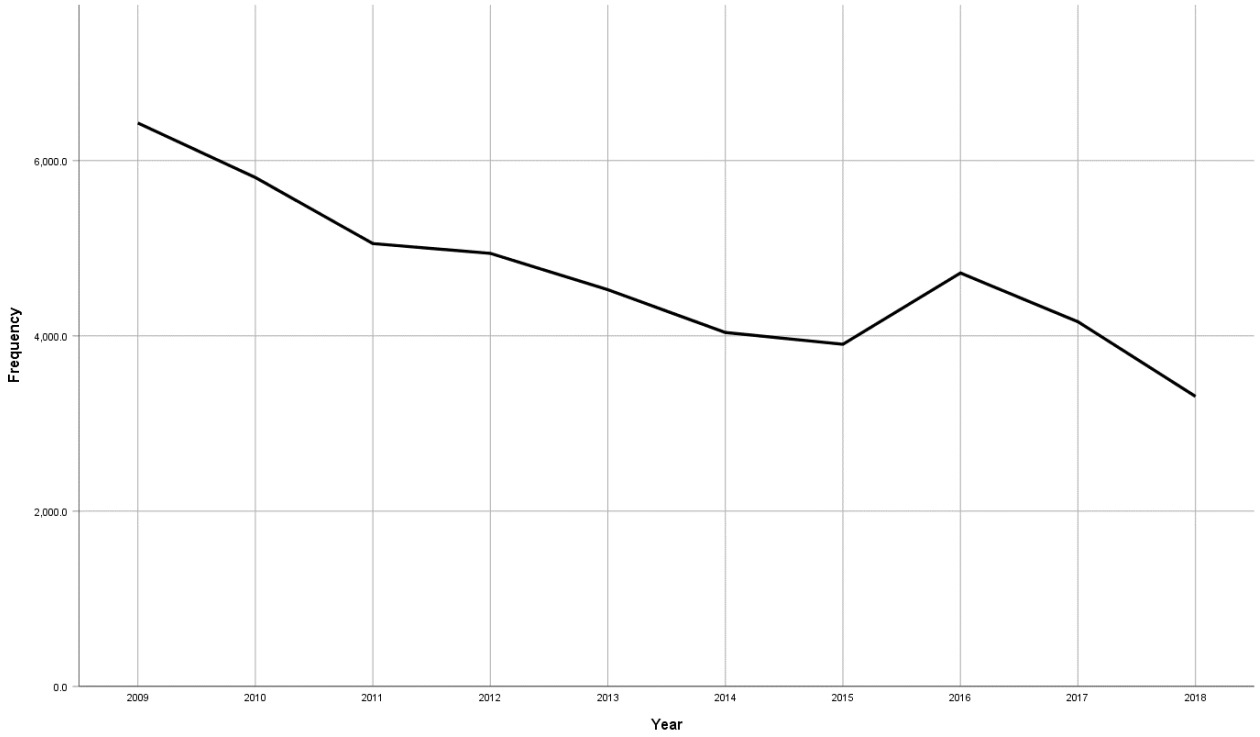


Figure 2. Frequency of Opioid Analgesic Prescriptions by Year



DISCUSSION

Opioids are the most prescribed medication of any drug category in the US with over 250 million prescriptions annually. However, they have also been reported to be used for nonmedical purposes. They have been combined with alcohol or sedatives to improve sleep, to increase energy, and to reduce anxiety. Regardless the source, either as a legitimate prescription or diversion, all of these factors contribute to the opioid abuse problem (11).

The most common sources for obtaining opioids and using them non-medically are family members or friends who divert (share) their prescriptions with the intent to help with apparent symptoms of distress or pain (4). It is estimated that up to 23% of the prescribed doses are ultimately used for nonmedical reasons (4). If an opioid prescription is necessary, dentists should educate patients to not share unused medication, and to properly dispose of any leftover medication once their condition has resolved. Reducing the amount of opioids dispensed in combination with patient education could potentially minimize the sharing of unused medication.

Most routine dental procedures and simple extractions can be managed with the use of over-the-counter pain medications such as Nonsteroidal anti-inflammatory drugs (NSAIDs) and acetaminophen. The prescription of opioid analgesics should be for a short period of time and limited to more complicated procedures (5), and only after treating the cause of pain.

It has been estimated that more than 50% of patients visiting the Emergency Department (ED) with non-traumatic dental pain receive opioids prescriptions (13). These, in conjunction with antibiotics, are commonly prescribed as a temporary solution until a dentist can provide a definitive treatment. However, if ED physicians and staff receive appropriate training on how to administer local anesthesia to relieve dental pain, it could possibly reduce the amount of unnecessary opioid prescriptions. In addition, dentists must frequently screen their patients by using available sources to monitor the history of prescribed drugs prior to a new opioid prescription.

Kazanis, et al., reported a significant increase in opioid prescriptions between 2001 and 2009 among military service members. It is believed that those results observed in the Military Health System can be associated to the sudden increase number of deployments after the events of 9/11 and with that, the number of military members coming back with chronic pain (10).

In the attempt to control this problem, in August 2009, the Army created the Pain Management Task Force with 109 pain-related recommendations divided into four areas. One of these areas (Focus on the Warrior and Family - Sustaining the Force) provides guidance on opioid prescribing and therapy to ensure the efficacy of pain treatment and reduce aberrant behavior, abuse, and addiction with opioids. Some of the recommendations include the implementation of a pain assessment screening tool that

helps providers identifying patients at risk of opioid dependence and ensuring these patients have access to structured pharmacy management programs that support opioid and medication pain management. Complementary and Alternative medicine are also a part of the recommendations for treatment of chronic pain.

In addition, fourteen separate directives or policies, to include the Army Substance Abuse Program, were developed by the DoD involving the prevention and treatment of prescription drug abuse by DoD providers, both military and civilian. (10). Clinicians in the Department of Veteran Affairs, and the Indian Health Service now also have mandatory continuing medical education requirements for pain and safe opioid prescribing (9).

The results of this study demonstrated a decrease in the number of opioid prescriptions written by dentists assigned to Fort Bragg, NC between 2009 and 2018. However, the available data did not allow for a determination if the decrease could be attributed to a decline in the number of dental providers on Fort Bragg. Another possible reason for the decline is increased provider awareness on proper opioid prescribing methods, and the increased use of NSAIDs as a safer alternative for pain control with fewer adverse effects and no minimal abuse potential (17).

Similar results were seen in an unpublished study by Bennett, et al., which assessed the changes in opioid prescribing habits of U.S. Army Dental Corps providers following completion of opioid prescriber safety training during the months of July - October in 2015 and 2017. They found a 17.4% decrease in the frequency of opioid prescriptions following completion of mandatory opioid safety training. However, it was not possible to relate the decrease in opioid prescription frequency with the completion of a mandatory training due to confounding variables such as increased social awareness of the opioid epidemic which could also be associated with the decrease (18).

This study does not provide data about the specialty of the provider writing the opioid prescription. Hence, it cannot be generalized the results of this study are applicable to all specialty dental providers. Hypothetically, it is possible to assume that most of the prescriptions for dental patients were written after some kind of surgical procedure, where the pain level was high enough to require opioids for pain control. Dental providers that have a short time interaction with patients, such as oral and maxillofacial surgeons, should communicate with the patient’s general dentist in regards to known, or potential, substance abuse problems.

The use of de-identified records in this study did not allow a determination if some of the data is counting for refills for the same patient, which can lead to underestimation of the rate of opioid prescriptions in dental patients. The results of this study are limited to one military base: Fort Bragg, NC. Although this is considered one of the largest military bases in the US, it cannot be assumed that similar results will be obtained nationwide in the military population. Further studies are warranted to address these limitations.

CONCLUSIONS

Although dentists prescribe opioids for the treatment of post-operative pain, and for a short period of time, opioid prescribing education for both dentists and patients could minimize the risk of opioid abuse problems. Opioid prescriptions should be reserved for situations where moderate-severe pain is anticipated, and alternative medications like NSAIDs employed for the management of mild post-operative pain. Additionally, dentists should remain vigilant to identify at risk patients for opioid abuse problems, and should collaborate with the patient's primary care provider in an effort to provide help and treatment of opioid dependence.

References

1. Abuse,N.I.(2019,January).*https://www.drugabuse.gov/drugsabuse/opioids/opioid-overdose-crisis*. Retrieved from https://www.drugabuse.gov/drugs-abuse/opioids/opioid-overdose-crisis
2. Dabbs, C., Watkins, E. Y., Fink, D. S., Eick-Cost, A., & Millikan, A. M. (2014). Opiate-Related Dependence/abuse and PTSD exposure among the Active-component U.S. Military, 2001 to 2008. *Military Medicine*, Vol. 179, p. 885-890.
3. Dana, R., Azarpazhooh, A., Laghapour, N., & Okunseri, C. (2017). Role of Dentist in Prescribing Opioid Analgesics and Antibiotics. *ClinicalKey*, 279-294.
4. Denisco, R., Kenna, G., O'neil, M., Kulich, R., Moore, P., Kane, W., Katz, N. P. (2011). Prevention of prescription opioid abuse. The role of the dentist. *The Journal of the American Dental Association*, 800-810.
5. Dionne, R. A., Gordon, S. M., & Moore, P. A. (2016). Prescribing Opioid Analgesics for acute dental pain: Time to change clinical practices in response to evidence and misperceptions. *Compendium*, 372-378.
6. Falk, J., Friesen, K. J., Magnusson, C., Schroth, R., & Bugden, S. (2019). Opioid prescribing by dentists in Manitoba, Canada. *JADA*, 122-129.
7. Florence, C., Zhou, C., Lou, F., & Xu, L. (2019). The Economic Burden of Prescription Opioid Overdose, Abuse, and Dependence in the United States, 2013. *American Association of oral and maxillofacial surgeons*, 1-5.
8. Harbaugh, C., Nalliah, R., Hu, H., Englesbe, M., Waljee, J., & Brummett, C. (2018). Persistent opioid use after wisdom tooth extraction. *The Journal of the American Medical Association* , 504-506.
9. Katzman, J. G., Qualls, C. R., Satterfield, W. A., Kistin, M., Hofmann, K., Greenberg, N., Arora, S. (2018). Army and Navy ECHO pain telementoring improves clinician opioid prescribing for military patients: and observational cohort study. *CrossMark*, 387-395.
10. Kazanis, W., Pugh, M., Tami, C., Maddry, J. K., Bebarta, V., Finley, E., Potter, J. (2018). Opioid use patterns among Active Duty service members and civilians: 2006-2014. *Military Medicine*, 157-164.
11. McCauley, J. L., Hyer, M., Ramakrishnan, R., Leite, R., Melvin, C. L., Fillingim, R., Brady, K. (2016). Dental opioid prescribing and multiple opioid prescriptions among dental patients. *The Journal of the American Dental Association*, 537-544.
12. Mutlu, I., Abubaker , A. O., & Laskin , D. M. (2013). Narcotic precribing habits and other methods of pain control by oral and maxillofacial surgeons after impacted third molar removal. *Journal of Oral Maxillofacial Surgery*, 1500-1503.

13. Patel, N. A., & Afshar, S. (2017). Addressing the high rate of opioid prescriptions for dental pain in the emergency department. *American Journal of Emergency Medicine*, 138.

14. Resnick, C. M., Calabrese, C. E., Afshar, S., & Padwa, B. L. (2019). Do Oral and maxillofacial surgeons over-prescribe opioids after extraction of asymptomatic third molars? *American Association of Oral and Maxillofacial surgeons*, 1-5.

15. Toblin, R. L., Quartana, P. J., Riviere, L. A., Clarke Walper, K., & Hoge, C. W. (2014). Chronic pain and opioid use in US soldiers after combat deployment. *The Journal of the American Medical Association Internal Medicine*, 1400-1401.

16. Schroeder, Dehghan, Newman, Bentley, & Park, 2018. Association of Opioid Prescriptions From Dental Clinicians for US Adolescents and Young Adults With Subsequent Opioid Use and Abuse. *JAMA Intern Med.* 179*(2)*:145-152. doi: 10.1001/jamainternmed.2018.5419

17. Gupta, N., Vujicic, M., & Blatz, A. (2018). Opioid prescribing practices from 2010 through 2015 among dentists in the United States. *Journal of the American Dental Association*, 237-245.

18. Bennett, A., Delfs, B., & Beltran, T. (2020). Assessing Changes in Opioid Prescribing Habits of U.S. Army Dental Corps Providers Following Completion of Opioid Prescriber Safety Training.- Unpublished study as part of master's thesis.