

**PRESCRIPTION OPIOID MEDICATIONS: BEHAVIOUR, KNOWLEDGE, AND
BELIEFS OF POTENTIAL RISKS AMONG YOUTH UNDERGOING ORAL SURGERY
PROCEDURES**

by

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D.D.S., The University of Toronto, 2021

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

in

THE FACULTY OF GRADUATE AND POSTDOCTORAL STUDIES
(Craniofacial Science)

THE UNIVERSITY OF BRITISH COLUMBIA
(Vancouver)

January 2024

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Prescription Opioid Medications: Behaviour, Knowledge, and Beliefs of Potential Risks
Among Youth Undergoing Oral Surgery Procedures

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the degree of Master of Science

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Abstract

Canadian youth have demonstrated the fastest-growing rates of opioid-related hospitalizations in the past decade. Prescription opioid medications, although effective in alleviating severe post-operative pain, also have the potential for misuse and diversion. Oral surgery procedures are often the first exposure to opioids for youth patients. This population has been understudied despite being substantially affected by the opioid crisis. The aim of this study was to determine how informed youth (ages 15 to 24) are about potential risks associated with prescription opioid use following oral surgical procedures. An anonymous, 32-item survey was administered through Qualtrics to youth patients following oral surgical procedures to assess behaviour, knowledge, and beliefs about prescription opioid use. Participants were recruited from ten oral surgery practices in British Columbia during six months. A total of 177 responses were recorded. 121 (68.4%) participants received an opioid prescription, and only 2 (2%) participants stored their medication in a locked location. For those who did not, 80.7% indicated they were not worried about anyone taking it. Of the 84 (69.4%) participants with leftover pills (mean: 17.7 pills/participant), 71 (84.5%) reported still having them in their possession, with 33 (46.5%) intentionally saving them for future need. Compared to females, males were more likely to believe that prescription opioids are safer than other substances ($P=0.006$), and that they are less likely to get into trouble using them ($P=0.046$). Multivariate logistic regression models demonstrated that the male sex is a significant predictor of prescription opioid misuse ($P=0.043$). This study indicates a general lack of knowledge among participants and demonstrates that youth are not well informed of the potential risks associated with prescription opioids. In conclusion, it is essential to implement a practical approach to inform youth of the implications surrounding prescription opioid use and its potential for adverse health outcomes.

Lay Summary

The ongoing opioid crisis has dramatically affected the Canadian youth population. Although prescription opioids may be used for pain management, they also carry a risk of misuse and diversion. The purpose of this study was to determine how informed youth (ages 15 to 24) are about potential risks associated with prescription opioid use following oral surgical procedures. Survey results indicated a general lack of knowledge among participants and believed misconceptions surrounding prescription opioids. The majority of participants who received a prescription did not store the pills correctly, and had unused pills that were not disposed of, with many wanting to save them for future needs. This study demonstrates that there is potential for opioid misuse and diversion following oral surgical procedures. It is essential to implement a practical approach to better inform youth of the implications surrounding prescription opioid use.

Preface

This thesis is an original, unpublished work by the author, S. Lam. The Ethics approval was received by the Behavioural Research Ethics Board at the University of British Columbia on July 25th, 2022 (UBC BREB Number: H22-00832).

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List of Abbreviations

AAOMS	American Association of Oral and Maxillofacial Surgeons
ADA	American Dental Association
BC	British Columbia
CBT	Cognitive Behavioural Therapy
CDC	Centers for Disease Control and Prevention
CSDBC	College of Dental Surgeons of British Columbia
FDA	Food and Drug Administration
HIV	Human Immunodeficiency Virus
MMT	Methadone Maintenance Treatment
NSAID	Non-Steroidal Anti-Inflammatory Drug
NSDUH	National Survey on Drug Use and Health
OAT	Opioid Agonist Treatment
OMFS	Oral and Maxillofacial Surgeons
OTC	Over-The-Counter
OD	Opioid Use Disorder
PO	Per Os
QR	Quick Response
RCDSO	Royal College of Dental Surgeons of Ontario
SPSS	Statistical Package for Social Sciences™
US	United States
WHO	World Health Organization

Acknowledgements

This work could not have been possible without the guidance from my supervisor, Dr. Donnelly (who insists that I must call her Leeann!). Words truly cannot express how much your support throughout my graduate studies has meant to me. Your immense knowledge, kindness, and mentorship have been invaluable to my growth as a student and researcher. You celebrated every small win with me while also being there during the more difficult times. Thank you for believing in me and in this project. Every graduate student should have a supervisor like you, and I am so grateful that I have had the opportunity to work with you.

To my amazing committee members, Drs. Aleksejuniene, Matthew, and Yen, thank you for your unwavering support, time, and efforts throughout this project. Your dedication to your graduate students is unparalleled, and this was no exception.

I would also like to thank the participating oral surgeons and staff members who supported this project. I would not have been able to gather such meaningful data without your help.

To the graduate orthodontics faculty members and instructors I have had the honour of learning from, thank you all for being such great examples of what hard-working, compassionate orthodontists are like. Your commitment to teaching has left such a positive impact on me.

And to my co-residents... the true “dream team”. Thank you for all the laughs, shared experiences, and camaraderie over the past three years. I am so proud of how far we’ve all come, and I am excited to see where this career will take us!

Dedication

I would like to preface by saying that I have always dreamed of living on the West Coast. To have the opportunity to turn this dream into a reality while simultaneously pursuing orthodontics is something I will cherish forever. All this is to say, I know that home is where my family and loved ones are and to whom I'd like to dedicate this thesis.

To my parents, the most loving, supportive, and selfless people I will ever know... thank you for everything. It's impossible to adequately express my gratitude to the two people who have spent their lives working tirelessly, sacrificing so much, and doing everything they can just to make sure that their children are happy. I love you both more than anything.

To my siblings, Andrea and Justin (and Jeff and Tori!), you have been my role models from the very beginning. Thank you for always being there when I need someone to lean on, and never being afraid to tell me when I'm being a pain in the butt. The bond that we all share is unbreakable. I know we will always be there for one another no matter what life throws our way. Let this thesis mark the official end of my formal education journey, but more importantly, the end of you all having to hear me complain about the stresses that come with it!

Lastly, to Andy... thank you for the unconditional love, even when it's from thousands of miles away. The past few years have shown us that we can make it through anything, and I'm excited for the life that we are building together.

Chapter 1: Introduction

1.1 Current Landscape of the Opioid Crisis in Canada

There is a global opioid crisis that continues to have devastating impacts, taking the lives of countless individuals. The development of this public health crisis has evolved over the past two decades and continues to grow through the misuse and diversion of opioids. Worldwide, it is estimated that over 69,000 people die from an opioid overdose annually [1]. Within Canada, approximately 38,514 opioid toxicity deaths occurred between January 2016 and March 2023, which increased by 91% during COVID-19 [2,3]. In 2023 alone (January to March), there have been a total of 1,309 opioid-related hospitalizations and 1,904 fatalities, equivalent to 21 deaths per day [2]. Of this, over 88% of the deaths have occurred within British Columbia (BC), Ontario, and Alberta [4]. In BC, over 11,500 opioid-related deaths have been reported since being declared a provincial public health emergency on April 14, 2016 [2]. Although other Canadian provinces have also shown increasing rates of overdose, BC has consistently been the most impacted province in the country [5].

The current opioid crisis has harmful consequences. By understanding the driving forces behind it, strategies can be developed to mitigate the adverse outcomes that have resulted in the morbidity and mortality of so many.

1.2 What are Opioids?

Opioids are a group of medications that mimic endogenous opioid peptides known as endorphins. They are a class of drugs that are naturally found in the opium poppy plant [6]. By exerting their effect through stimulation of opioid receptors, mu (μ), kappa (κ), and delta (δ), they alter the nervous system's response to painful stimuli [6]. Opioids are most commonly prescribed

for the treatment of acute pain, as well as moderate and severe chronic cancer and non-cancer pain that is inadequately alleviated with non-opioid modalities [7].

Opioids can be prescribed medications, and are divided into pure agonists (codeine, morphine, heroin, oxycodone, methadone, hydrocodone, fentanyl), partial agonists (buprenorphine, butorphanol, tramadol), and mixed agonists-antagonists (butorphanol, pentazocine, nalbuphine). The most commonly prescribed opioids include hydrocodone, oxycodone, morphine, codeine, and fentanyl [6].

1.3 Adverse Effects and Risks of Opioid Use

Common opioid adverse effects include central nervous system effects (dizziness, confusion, drowsiness, sedation, euphoria, dysphoria, and restlessness), gastrointestinal side effects (nausea, vomiting, and constipation), cholinergic effects (xerostomia, bradycardia), fatigue, urinary retention, weight gain, diaphoresis, pruritis, flushing, urticaria, and cough reflex suppression [7]. Feelings of euphoria can be associated with opioid use and creates the potential for misuse. The feeling of euphoria experienced by patients results in continued use of opioids despite the serious adverse side effects [8]. Physical dependence is the most common side effect seen in chronic opioid use. Once an individual is physically dependent, continuous opioid intake is required to prevent significant withdrawal symptoms [8]. These withdrawal symptoms include restlessness, sweating, insomnia, lacrimation, tremor, nausea, vomiting, diarrhea, abdominal pain, fever, myalgias, hypertension, tachycardia, and increased respiratory rate [7]. Following repeated exposure to opioid medications, patients develop tolerance, which is defined as a reduced amount and duration of analgesia, as well as less sedative and euphoric effects at stable doses [7].

Respiratory depression is a serious adverse effect of opioid use that can be potentially life-threatening [7]. As opioids depress respiratory drive, this reduced respiratory rate may lead to

hypoxemia, with subsequent cerebral hypoxia and impaired consciousness [9]. Respiratory suppression resulting in prolonged cerebral hypoxia is the driving force for brain injury and opioid overdose-related death. The risk of respiratory depression increases for opioid users with underlying pulmonary comorbidities, such as obstructive sleep apnea and severe chronic obstructive pulmonary disease, or when used in conjunction with sedatives, including alcohol or benzodiazepines [8]. Furthermore, the risk of early death for people with an opioid use disorder is increased by a factor of 20, primarily due to accidental overdose, trauma, or suicide [8].

1.4 Treatment for Opioid Overdose and Opioid Use Disorder

Opioid overdose results from an excessive intake of the substance. The signs of an opioid overdose include unconsciousness, palor, cyanosis, miosis, decreased respiratory rate, shallow breathing, reduced muscular tone, emesis, and a faint pulse [10]. Most opioid overdoses are witnessed by a partner, family member, or close friend and typically occur in a private home [9]. Therefore, the opportunity for rescue exists. Many opioid overdose deaths can be prevented by basic life support resuscitation and if symptom-reversing treatment is administered within a timely fashion [11].

Naloxone is a semi-synthetic competitive opioid antagonist that is capable of rapidly reversing all clinical signs of an opioid overdose. Significantly, it alleviates respiratory depression within one to two minutes of administration [11]. Naloxone may be administered intramuscularly, intravenously, or intranasally. Based on World Health Organization (WHO) guidelines, the recommended dose of naloxone is 0.4mg, repeated as necessary [1]. It works in the body for only 30 to 90 minutes. Therefore, calling 911 is essential as immediate medical attention is still required. Although high doses may result in adverse effects such as those seen during opioid withdrawal, naloxone carries no potential for abuse [9]. In Canada, naloxone is most commonly available in

Take Home Naloxone Kits and can be administered as either an intramuscular injection or nasal spray device [12].

Opioid agonist treatment (OAT) is a safe and effective treatment for opioid use disorder (OUD) [13]. In a population-based retrospective cohort study conducted in BC, they concluded that retention on OAT was associated with a significantly reduced mortality risk for people with an OUD [13]. Treatment for OUD typically includes medically assisted detoxification and maintenance with opioid substitution therapies. By administering controlled amounts of longer-acting opioids, this can help reduce or prevent withdrawal symptoms. The two most common opioid substitution therapies are buprenorphine and methadone [11].

Buprenorphine is seen as first-line pharmacotherapy and is the preferred method of agonist therapy [14]. It is a long-acting partial opioid agonist that was approved in 2002 by the Food and Drug Administration (FDA) for treatment of opioid dependence. Being a partial opioid agonist, it carries less risk of overdose and produces less severe withdrawal symptoms when used long-term compared to a full opioid agonist [11]. Suboxone is a combined formulation of buprenorphine and naloxone [12]. When taken sublingually as prescribed, suboxone acts to prevent withdrawal and reduce opioid cravings, which effectively reduces the drive for a physically dependent individual to seek additional opioids, such as fentanyl, heroin, and prescription opioids. Oral administration allows the therapeutic effects of buprenorphine to predominate, while naloxone is not absorbed and has no effect. However, injection of suboxone results in naloxone “blocking” the euphoric effects of injected buprenorphine. Therefore, naloxone acts as a deterrent for those attempting to inject suboxone rather than taking it orally as prescribed [12]. The recommended maximum daily dose of suboxone is 24mg, with 12mg to 16mg per day being optimal for most individuals. If a dose that exceeds 24mg is needed to suppress withdrawal symptoms adequately, clear

documentation and justification are required. US guidelines state that some patients may require a dosage of up to 32mg per day [15].

Methadone is a long-acting full opioid agonist used to help alleviate withdrawal symptoms and help manage opioid cravings. As methadone is a full opioid agonist, it carries a higher risk of severe side effects and overdose potential compared to buprenorphine [15]. Methadone is available in liquid form, either diluted with water or juice, and is taken orally. A daily dose of 80mg per day or higher typically results in optimal treatment outcomes for most patients. However, doses above 120mg per day may be necessary to allow full opioid blockade and suppression of withdrawal symptoms [14]. Individual variability and dose prescription need to be carefully assessed. The effects of methadone last for 24 to 36 hours, compared to short-acting opioids that are effective for 3 to 6 hours and often injected several times a day. Methadone maintenance treatment (MMT) is a comprehensive pharmacotherapy program that involves long-term prescribing of methadone as an alternative to the opioid on which the individual was previously dependent. The ultimate goal of MMT is to medically manage those with an OUD at a therapeutic dose, allowing stabilization and maintenance of an opioid-free lifestyle [14].

In Canada, buprenorphine/naloxone treatment is indicated for patients over 18 years of age, and is also recommended as the preferred first-line treatment for youth with no contraindications [16]. In contrast, methadone for the treatment of OUD in youth has yet to be studied in a controlled trial. As such, methadone should only be considered for youth who struggle with ongoing illicit opioid use while on adequately dosed buprenorphine/naloxone [16].

Moreover, residential treatment facilities and psychosocial treatment interventions such as cognitive behavioural therapy (CBT) and psychotherapeutic counselling appear to be beneficial in treating patients with OUD. Studies have demonstrated their effectiveness as adjuncts in improving

treatment retention and completion, sustaining abstinence from opioids, and helping reduce or prevent opioid use and related harms [16].

Although treatment interventions are available for those with OUD, less than 10% of people who require such treatment are receiving it [1]. When opioid use is restarted following a period of abstinence, there is an elevated risk of opioid overdose due to rapid loss of tolerance [9]. This is commonly seen when withdrawal management is used as a sole treatment for OUD. Withdrawal symptoms, particularly cravings, can continue for weeks or months following cessation of substance use [16]. As such, care providers should encourage a period of OAT or a slow taper with buprenorphine/naloxone or methadone. Withdrawal management alone is neither sufficient nor appropriate and is not an effective treatment for OUD [14].

A systematic review conducted by Cragg *et al.* (2019) aimed to identify risk factors for the development of opioid misuse among patients prescribed opioids. Six previous meta-analyses concluded that risk for misuse was associated with younger age, increased pain, longer exposures to opioids, and greater opioid doses [17]. Furthermore, of the 33 factors examined, male sex, current or history of licit or illicit substance use, and mental health diagnoses were consistently associated with an increased risk of developing OUD. Although recognizing groups that may be at higher risk of developing OUD can allow for a more cautious approach to opioid prescribing, misuse and adverse outcomes can be seen in people of all ages, socioeconomic, and educational backgrounds [8]. Opioids can negatively affect anyone, and safe prescribing practices should not just be reserved for “high risk patients” [18]. Every patient is at risk for opioid misuse [18].

1.5 Misuse and Diversion of Prescription Opioids

Misuse and diversion of opioids explains the overwhelming number of overdose deaths [19]. People misuse prescription opioids when they self-administer the medication in a way that

was not intended by the prescribing clinician, such as taking opioids at a higher dose than prescribed or through different routes of administration. Opioids are often prescribed per os (PO), and are misused when crushed, dissolved in water, injected into a vein, or snorted [6]. The motivation for patients to misuse or mix opioids with alcohol or other substances may include the euphoric feeling or sense of ease and well-being [20]. Commonly misused prescription drugs include oxycodone (i.e. Percocet), codeine (i.e. Tylenol #3), morphine, hydromorphone (i.e. Dilaudid), and meperidine (i.e. Demerol) [20]. Opioid-related morbidity and mortality occurs not only in the patient population who were prescribed opioids, but also through diversion to individuals without opioid prescriptions [21]. Prescription opioid diversion refers to the redirection of prescribed drugs for non-medical, illicit use, either for their own use or to give or sell to others [22]. In a 2021 qualitative study conducted in Vancouver, BC, Canada, 21 participants who diverted prescription opioids were interviewed. Participants identified a variety of benefits to diversion, including financial incentives, the opportunity to assist a friend or family member, and the ability to provide a “safer” drug supply to prevent overdose and other harms [22].

1.6 Illicit Opioid Use

Although prescription opioids are contributing to the public health crisis, many adverse outcomes are due to the use of illicit opioids as well [23]. Research has suggested that misuse of prescription opioids is a risk factor for starting heroin use [6]. About 80% of people who use heroin misused prescription opioids initially [6]. More recently, the introduction of illicitly-manufactured fentanyl and its related analogues into the illegal drug supply has created an unsafe, fatal environment for anyone who uses illicit drugs [17]. The emergence of this potent synthetic opioid in illicit drugs has become a major contributor to the current opioid crisis [24]. Accidental opioid-related overdoses have been primarily attributed to the influx of fentanyl into the illicit drug system

[5]. Fentanyl is approximately 50 times as potent as heroin, and only 2mg of pure fentanyl is required to cause death in an average-sized adult [24]. The lack of ability to visualize, smell, or taste fentanyl makes the detection of its presence in illicit drugs nearly impossible [3]. Fentanyl is commonly mixed with heroin, cocaine, ecstasy, and methamphetamine [24]. Within the first three months of 2016, BC saw more than 200 overdose deaths that were attributable to fentanyl [19]. This sudden rise in fentanyl-related fatalities led to the province's declaration of a public health emergency in 2016 [19]. That year, 53% of opioid-related deaths in Canada involved fentanyl or an analogue [25]. Between May 2020 and April 2021, illicitly manufactured fentanyl was involved in 64% of over 100,000 overdose deaths in the US [26].

Carfentanil is a potent synthetic fentanyl analogue used in veterinary practice, noted to be 20-fold more potent than fentanyl. The North American illicit drug supply has reportedly contained carfentanil since 2016, representing a significant threat to individuals using illicit opioids [27,28]. The opioid crisis is driven by both prescription and illicit opioid use, with fentanyl and its analogues contributing to the rise in opioid-related deaths [25].

1.7 Youth Risk Factors and Access to Opioids

In the US, opioid misuse accounts for 20% of all deaths among youth [29]. Moreover, Canadian youth ages 15 to 24 have demonstrated the fastest-growing rates of opioid-related hospitalizations in the past decade [9]. In 2019, 20% of opioid-related deaths in Canada occurred among youth [30]. From 2001 to 2018, 13,009 youth ages 12 to 24 in BC were identified with an opioid use disorder [31]. Young people ages 13 to 29 accounted for 20.4% of all illicit opioid overdose deaths in BC from January 1 to October 31, 2017 [16].

Due to ongoing biological, social, and psychological development, youth are particularly susceptible to the negative impacts of opioid misuse [32]. Youth occupy “critical biopsychosocial

development periods”, where the brain’s reward center is developmentally wired to seek out high stimulating behaviours that gain large neurologic rewards, such as those triggered by opioids [30,33]. As a result, opioid use in youth populations have been associated with polysubstance use disorders, increased risk of blood-borne infections such as human immunodeficiency virus (HIV) and hepatitis C virus, and significant societal and legal problems [16]. Furthermore, social distancing measures enacted during the COVID-19 pandemic forced youth to shift their “norm” of social interactions with peers, increasing interactions with family and time spent at home, and fewer extra-curricular activities with friends. This abrupt transition has resulted in a significant decline in mental health and an increase in opioid misuse and abuse [30].

It has been reported that 14% of Canadian teens have taken prescription medications that were not initially prescribed to them [24]. In 2017, the Ontario Student Drug Use and Health Survey reported that 10.6% of students from grades 7 to 12 used diverted prescription opioids in the past year. Furthermore, the 2019 survey found that approximately 40.2% of Canadian students from grades 7 to 12 obtained prescription opioids from a parent [34]. A 2019 American study reported that opioid overdose is more likely to occur in families where a family member in the household was prescribed an opioid [23]. These findings were consistent with Finkelstein *et al.* (2017), who earlier studied the relationship of opioid overdose in young children of mothers previously prescribed opioids [35]. Their results demonstrated that children were more likely to overdose when they had a mother who received an opioid prescription, with an unadjusted odds ratio of 2.41 [35]. Hudgins *et al.* (2019) conducted an analysis of the National Survey on Drug Use and Health (NSDUH) in the US for the years 2015 and 2016, which included 27,857 adolescents ages 12 to 17 and 28,213 young adults ages 18 to 25 [36]. The authors found that of the 1,050 adolescents and 2,207 young adults who reported opioid misuse, 55.7% obtained the opioids from

friends or relatives. Furthermore, 25.4% of those misusing opioids received them from the healthcare system.

In a retrospective cohort study conducted in BC, 94.8% of youth ages 12 to 18 years came into contact with the health care system in the year before their opioid use disorder diagnosis [31]. Similarly, McCabe *et al.* (2013) aimed to identify the source of non-medical use of prescription opioids among high school seniors through a multi-cohort national study conducted in the US. In a sample of 647 high school seniors who reported non-medical opioid use, 36.9% obtained these opioids from their own previous prescriptions [37]. Of these, 27.1% received the opioids from a dentist, 45% from an emergency room doctor, and 38.3% from another doctor [37]. These results highlight the importance of screening, identification, and early intervention of OUD among youth [31].

Opioid use is a risk factor for increased risk of subsequent opioid use and misuse among youth. A prospective study conducted in the US in 2015 followed a sample of 6,220 students in grade 12 until age 23, demonstrating a 33% increased risk of future opioid misuse in students who took prescription opioids during high school compared to those without opioid prescriptions [38]. Similarly, Schroeder *et al.* (2019) conducted a retrospective cohort study that found exposure to opioids in adolescents and young adults ages 16 to 25 years resulted in higher rates of opioid use three months and a year later when compared to non-opioid controls [39]. The authors concluded that subjects who received opioids following third molar removal had a 6.8% increased risk of persistent opioid use and 5.4% increase in subsequent diagnosis of opioid abuse [39].

Youth are clearly gaining access to prescription opioids, either through unused, excess tablets of their previous prescriptions or from family members and friends. By gaining a better

understanding of prescription opioid diversion, prevention and intervention efforts can be made to reduce its adverse effects and consequences.

1.8 Pain Management in Dentistry

Pain management is an essential component in dentistry and encompasses numerous aspects. Through a wide variety of modalities, dentists can provide safe and effective pain management strategies. The most frequently encountered pain in dentistry is acute inflammatory pain [40]. The management of acute pain implies elimination of the causative agent, disease, or disorder. Dentists are trained to eliminate the source of pain whenever possible. Depending on the clinical situation, this may be accomplished through dental procedures such as a pulpectomy, caries removal, incision and drainage, or tooth extraction [40].

Moreover, dentists assess which procedures are likely to produce increased pain and use clinical judgment to effectively prevent and manage acute post-operative pain. Most pain during dental procedures can be adequately managed with local anaesthetic. However, post-operative pain remains a common occurrence in dentistry [40]. Invasive dental procedures such as endodontic treatment, periodontal surgery, and third molar extractions often result in significant post-operative pain and discomfort. This may be due to factors such as insufficient pain relief, intolerable side effects, or the patient's pain tolerance and ability to self-cope [41]. For most patients, post-operative pain is most significant two to three days following the procedure, after which it is expected to gradually resolve [42]. Adjunctive methods can help reduce post-operative dental pain, including both non-pharmacological and pharmacological measures.

The responsibility of dentists to provide safe, timely, and effective post-operative pain management is multi-faceted. With numerous analgesics available, adequate assessment of

individual analgesic requirements is critical for effective management of acute post-operative dental pain.

1.8.1. Current Prescription Guidelines

Developing pain management strategies provides clinicians with insight on how to relieve acute post-operative dental pain best. Appropriate knowledge and professional judgment is required when prescribing analgesics to manage a patient's acute pain [42]. By understanding and implementing current prescription guidelines, dentists can effectively establish patient comfort while maintaining patient safety.

Prescriptions should be patient-specific and patient-centred [7]. Dentists must individualize the prescribed analgesic based on the patient's medical history and anticipated level of post-operative pain [42]. The first choice for acute dental pain management is non-opioid alternatives- acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs). Acetaminophen is the first-line agent used to manage mild to moderate pain. From a risk-benefit standpoint, it is relatively safe when used in therapeutic doses, and is devoid of the side effects associated with NSAIDs [40]. Acetaminophen is administered at a dose of 500 to 1000mg q4-6h, with a daily maximum of 4g. If acetaminophen is unable to alleviate dental pain, the next available agents are NSAIDs, such as ibuprofen or naproxen. Ibuprofen is administered at 400 to 600mg q4-6h, with a daily maximum of 2400mg. Studies have consistently demonstrated that appropriate administration of NSAIDs is effective in managing the majority of dental patients experiencing moderate to severe pain. However, if stronger analgesia is still required, combining acetaminophen and NSAIDs can effectively provide faster and prolonged duration of action. Not only is this a safer option with fewer adverse effects than opioids, but it offers synergistic, more effective analgesia as well [13]. Contraindications to NSAIDs may include an allergy or conditions such as upper gastrointestinal

bleeding or severe asthma [42]. Only after the dosages of these non-opioid analgesics have been maximized should an opioid be considered.

Guidelines aim to reduce the harms associated with prescription opioid use. Guidelines set out by the Royal College of Dental Surgeons of Ontario (RCDSO) on the role of opioids in the management of acute and chronic pain in dental practice emphasizes that opioids are required in very few clinical situations within dentistry [42]. It is prudent that the dose of the non-opioid is maximized before considering an opioid. When opioids are indicated, the clinician must first use best clinical judgment to assess the patient's dental condition and response to other non-opioid therapies. This includes conducting a thorough medical and dental history, and determining the use of current medications, potential drug interactions, and history of substance use. Prescribing opioids for dental pain should only be considered in combination with acetaminophen or an NSAID. The first opioid to consider is codeine, at a dose of 30 to 60mg. If codeine is insufficient, oxycodone is the next opioid to consider, at a dose of 5 to 10mg [42]. Oxycodone is most commonly available in combination with acetaminophen (Percocet) or ASA (Percodan) [40].

The 2016 Centers for Disease Control and Prevention (CDC) Guidelines state that *“clinicians should prescribe the lowest effective dose of immediate-release opioids and should prescribe no greater quantity than needed for the expected duration of pain severe enough to require opioids. Three days or less will often be sufficient; more than seven days will rarely be needed”* [14]. The American Dental Association (ADA) released a statement in 2016 on the Use of Opioids in the Treatment of Dental Pain, that states; *“dentists should consider non-steroidal anti-inflammatory analgesics as the first-line therapy for acute pain management... [and] should recognize multimodal pain strategies for management for acute post-operative pain as a means for sparing the need for opioid analgesics”*. In 2018, the ADA made statutory limits that are

consistent with the CDC Guidelines, limiting opioid dosage and duration to no more than seven days for treatment of acute pain. Similarly, the American Association of Oral and Maxillofacial Surgeons (AAOMS) released a White Paper in 2017 in response to the ongoing opioid crisis [45]. This paper provides recommendations for the prescription of opioids and urges clinicians to prescribe non-opioid analgesics for acute post-operative pain.

1.9 Prescribing Habits Following Third Molar Removal

Prescribing opioids to manage both acute and chronic pain, although discouraged, is a common practice across North America. In 2017, more than 191 million opioids were dispensed to patients in the US [18]. Despite being 5% of the world's population, US citizens consume approximately 80% of the global opioid supply [46]. After the US, Canada is the 2nd largest per-capita consumer of prescription opioids. In 2018, approximately 1 in 8 Canadians were prescribed an opioid, 12.3% of the population. Of this, 56.1% were prescribed codeine [21].

Studies have shown that dentists prescribe 12% of all opioid prescriptions, with two-thirds of dental opioid prescriptions being written for surgical treatments and the other one-third being prescribed for non-surgical reasons, such as restorative dentistry [18]. In a study conducted by Chua *et al.* (2021), they found that 65.2% of all dental-related opioids from 2013 through 2018 were prescribed for tooth extractions. Third molars accounted for 40% of these extractions [43].

Third molars (i.e. wisdom teeth) erupt into the oral cavity around 15 to 25 years of age. Third molars are the final teeth to erupt; are frequently impacted in the maxilla and/or mandible [47]. One of the most routine clinical decisions that oral and maxillofacial surgeons (OMFS) make is how to best manage impacted third molars [47]. Indications for extracting third molars include impaction, infection, damage to adjacent teeth, periodontal disease, and risk of pathology [47]. These issues may arise without any prior signs or symptoms, indicating that absence of symptoms

does not equate to absence of disease [48]. The AAOMS published a position statement on third molar management in 2016, stating that “*predicated on the best evidence-based data, third molar teeth that are associated with disease, or at high risk of developing disease, should be surgically managed. Active clinical and radiographic surveillance is indicated in the absence of disease or significant risk of disease*” [49]. Risks related to removing impacted third molars increase with age [50]. Given the documented high incidence of problems associated with third molars over time and the adverse effects associated with maintaining them, it has become common practice for clinicians to extract third molars during youth when indicated [49].

While Canadian data regarding the prevalence of third molar removal is unavailable, approximately 5 million patients undergo third molar extractions annually in the US [51]. For the majority of youth, third molar extractions are their first exposure to opioid analgesics [52]. In the past, there has been a tendency for OMFS to over-prescribe opioid analgesics to avoid expected discomfort and return visits to the office [51]. The most commonly prescribed opioid-containing analgesics prescribed were hydrocodone with acetaminophen and oxycodone with acetaminophen [53].

Mutlu *et al.* (2013) investigated the prescribing patterns of OMFS following third molar extraction to determine if there was a tendency for surgeons to prescribe a *higher* dose than would otherwise be required to manage the expected post-operative pain adequately [54]. In this study, 384 randomly selected surgeons who were members of the AAOMS completed a survey that assessed routine opioid prescribing habits after impacted third molar removal, the most commonly prescribed opioid, as well as the dosage and number of tablets prescribed. Results demonstrated that the most common prescribed dosage of hydrocodone was 5mg. Furthermore, the number of tablets prescribed varied from 10 to 40, with the most common being 20 tablets, and 40 surgeons

prescribing 30 tablets [54]. Of the 384 OMFS surveyed, only two did not prescribe narcotics following third molar removal [54]. A similar study conducted in 2014 that surveyed Canadian OMFS found that the most common narcotic prescribed was 30 tablets of 30mg of codeine [55].

Approximately 54% of prescribed opioids for dental surgery go unused [18]. Maughan *et al.* (2016) conducted a randomized controlled trial that investigated opioid use patterns among patients undergoing surgical tooth extraction, where the primary objective was to assess opioid prescribing and consumption patterns, with the primary outcome being the number of remaining opioid pills on post-operative day 21 [56]. Of the 72 patients that filled their opioid prescription, the average number of pills received was 28, with 15 pills left over (54%) on day 21, leaving a total of 1,010 unused opioid pills [56]. In 2018, a similar study conducted at the Boston Children's Hospital investigated the use of opioid medication prescribed by three attending surgeons following asymptomatic third molar extractions in patients ages 14 to 25 [51]. Of the 81 participants, only 7% of patients took oxycodone during the seven-day post-operative period, for a total of 466 of the 486 prescribed oxycodone tablets left unused or unfilled. The remaining 72 patients used ibuprofen 600mg, while 70 patients used acetaminophen 650mg to manage post-operative pain. Han *et al.* (2020) determined that less opioids are being prescribed following third molar removal compared to at the onset of the opioid epidemic [57]. The authors suggested that increased regulations on opioid prescriptions have contributed to this decrease, as well as increasing evidence that supports the use of non-opioids to manage post-operative dental pain [57].

Based on the literature, it is evident that the gap between current prescription guidelines and clinical practice is significant. Clinicians are faced with conflicting goals of adequately managing post-operative pain while avoiding potential over-prescription of opioids [58]. Exposing patients to opioids, many of whom are young, first-time users, carries the risk of addiction and

misuse. By understanding the current trends in dentists' and OMFS' prescribing patterns, we can gain insight into best practices in prescribing pharmacotherapy for dental-related pain control. Reducing the number of prescribed opioids ultimately reduces the number of unused opioids available for misuse [58].

1.10 Youth Perceptions of Opioids

Youth are the biggest group of misusers of prescription opioids [20]. Previous literature has stated that approximately five to seven percent of youth receiving an opioid prescription will subsequently develop long-term opioid use or OUD [39,59,60]. There is a common perception among youth that prescription opioids are “safer” than non-prescription opioids [61]. A study conducted by Harbaugh *et al.* (2020) assessed youth perspectives on prescription pain medication, where 745 youth ages 14 to 24 were prompted with a series of questions that aimed to evaluate their exposure and access to prescription pain medication, as well as perceived safety of prescribed versus non-prescribed medications. 52% of respondents reported previous exposure to prescription pain medication, with 32.8% being related to acute dental care. The authors concluded that although youth may be aware of the ongoing opioid crisis, they perceived less risk associated with prescription opioids when compared to non-prescribed opioids. The perception of safety mainly stemmed from trust that the prescribing doctor had the patient's best interest in mind, where one respondent stated that it's “*safe, because it was prescribed by a doctor*”. Furthermore, there was a misconception that risks of addiction and overdose were decreased when the medication was prescribed for a medical reason. 77.4% of respondents considered non-prescribed pain medications to be unsafe, in contrast to 11.5% of respondents who considered prescribed pain medications to be unsafe [62].

Lord *et al.* (2011) surveyed 527 college students ages 18 to 25 to assess their motivations, beliefs, and attitudes associated with non-medical prescription opioid use. Of all respondents, 31% indicated misusing opioids regularly in the past year, with 56% having first misused prescription opioids in high school. The most commonly reported motives for non-medical prescription opioid use included “*to get high*”, manage chronic pain, and cope with depression or anxiety. Furthermore, majority of respondents perceived only a slight risk of harm associated with occasional non-medical use of prescription opioids, and moderate risk if regularly used. For those respondents who regularly misused prescription opioids, they perceived a lower risk of harm compared to those that infrequently misused opioids. Within the qualitative results, over 50% of respondents supported the belief that prescription drug misuse is less physically harmful than illicit drug use, such as cocaine and heroin [63].

Furthermore, a study interviewed first-year college students to assess the perceived harmfulness of non-medical prescription analgesic use and examined the prospective relationship between perceived harmfulness and subsequent non-medical use. The authors found that low perceived harmfulness was a significant risk factor for non-medical use. Individuals who expressed low perceived harmfulness were approximately ten times more likely to engage in non-medical prescription analgesic use compared to those with high perceived harmfulness [64].

There are several reasons why youth may begin using opioids, and the literature shows the negative impact that opioid misuse has had on this population. Although youth are one of the largest groups most affected by the ongoing opioid crisis, they are also highly understudied. Could it be that if these patients were better informed of the risks and side effects of opioid use, they may opt to take a non-opioid pain medication? Furthermore, could this change how youth perceive prescription opioids?

1.11 Study Rationale

The expansion of current efforts to mitigate the detrimental consequences of the current opioid crisis is necessary, particularly among youth. Oral surgical procedures are commonly one of the first exposures to prescription opioids. By exploring current knowledge, behaviour and beliefs associated with prescription opioids among youth, we will gain insight into why the opioid crisis has affected this population so substantially and how pain management for oral surgical procedures might be contributing to this crisis. Such information may aid the implementation of policies and programs aimed at reducing adverse health outcomes as a result of opioid use for oral surgical procedures.

1.12 Research Question

How informed are youth (15 to 24 years of age) about the potential risks associated with prescription opioid use following oral surgical procedures?

1.13 Study Aims

The aims of this research project were to:

- 1) Determine what instructions are provided to youth being prescribed opioid medications for oral surgical procedures.
- 2) Determine how opioid medications are prescribed for oral surgical procedures to youth, how they are used, and the potential level of their misuse.
- 3) Determine youth's knowledge of potential risks associated with prescription opioid use.

1.14 Study Hypothesis

Youth (15 to 24 years of age) are not well informed of the potential risks associated with prescription opioid use.

Chapter 2: Methods

2.1 Study Design and Survey Instrument

An anonymous web-based survey design was used to gather information about behavior, knowledge, and perceptions of risk among youth being prescribed opioid medications following oral surgery procedures. Questions from previous validated surveys were pre-selected for the current study based on the research aims and also to enable comparisons to previous studies [63–72]. The 32-item survey included one open-ended question, with the remaining questions close-ended (**Appendix A**). Demographic data and participant characteristics included information about gender, age, oral surgical procedure completed, instructions given, pain medication prescribed, quantity prescribed, quantity taken, and quantity of medications remaining. Survey questions also inquired about instructions on opioid storage and disposal given following the administration of prescription opioids, as well as youth's knowledge, beliefs, and behaviors concerning prescription opioid use. The final set of survey questions was piloted with a small sample of youth undergoing oral surgery procedures at a private practice in Vancouver, BC. Respondents provided feedback on the clarity and ease of completing the survey questions, and the total time required to complete the survey was also assessed. Seventeen participants were recruited to assist in piloting the survey, and then the necessary adjustments were made prior to implementation of the main survey. Minor adjustments involved a change of word choice in the question stem of two survey questions to increase clarity. The minimum sample size calculated from the pilot study was unattainable to achieve based on the study's intended recruitment methods. Therefore, it was decided that the current study could act as a pilot study for future research in this area, in which the minimum sample size could be calculated from.

2.2 Participants and Sampling

The survey described above was administered via Qualtrics^{©2023} software to a convenience sample of youth patients. Survey participants were recruited from 10 private oral surgery practices in the province of BC (**Figure 2.1**). A Letter of Initial Contact (**Appendix B**) was sent by e-mail to OMFS who are currently registered with the College of Dental Surgeons of British Columbia (CDSBC), describing the study and requesting their support for the study, which included informing potential participants of the study, posting a recruitment advertisement in their office (**Appendix C**), and sending youth patients by e-mail a link to the survey. Patients were included in this study if they were between the ages of 15 to 24 years and completed an oral surgery procedure (i.e. third molar/teeth extraction or orthognathic surgery) by an OMFS. Patients were excluded if they were unable to understand English and, as a result, were unable to complete the survey.

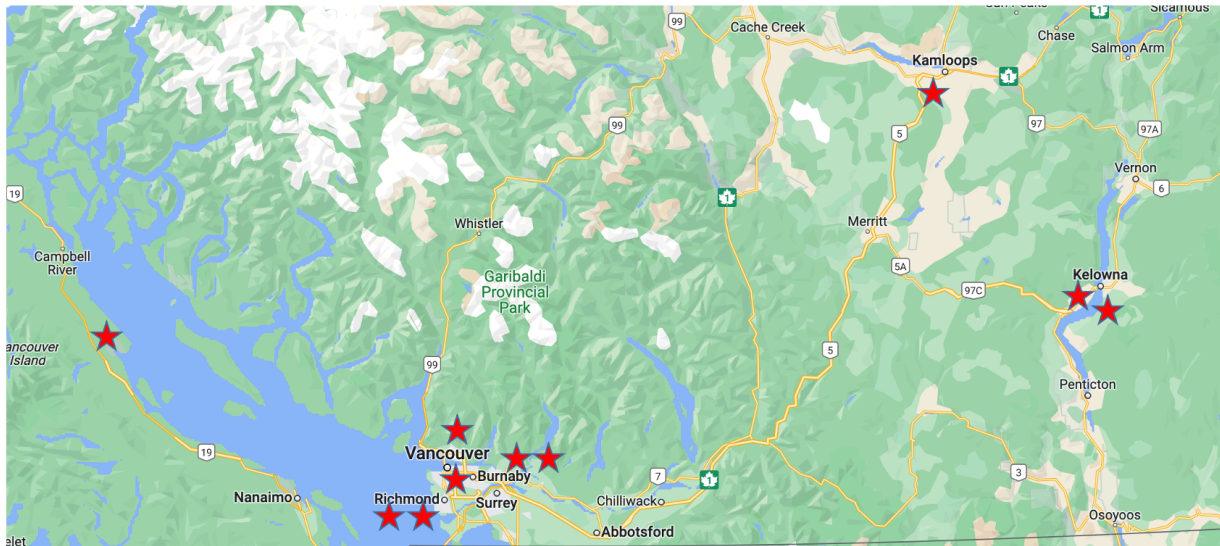


Figure 2.1. Locations of participating oral surgery offices

2.3 Sample Recruitment and Survey Administration

All procedures for sample recruitment and survey administration received approval by the Behavioural Research Ethics Board at the University of British Columbia on July 25, 2022. The original method of survey administration was for a receptionist or staff member at participating offices to inform all patients ages 15 to 24 years of the research study in their office following the completion of an oral surgery procedure. A receptionist/staff member script was provided to participating offices that outlined the purpose of the study and invited the eligible youth to participate in the study (**Appendix D**). On post-operative day seven, the receptionist or staff member sent via email a link to an anonymous online Qualtrics survey (**Appendix E**). The first email was sent one week post-operatively, and a reminder email seven days later. One week post-operatively was chosen arbitrarily, as it was expected that patients would have completed taking any pain medications to manage post-operative pain by this time. Eligible respondents were informed that the purpose of the survey was to “assess their knowledge, beliefs, and use of prescription opioid medications”.

During the OMFS recruitment period, it became evident that the original method of survey administration did not work with many OMFS offices’ current workflow, thus making them unable to support the study. As such, it was determined that certain OMFS offices would require different approaches to administer the survey that would work most effectively in regard to their office workflow. Therefore, for seven of the ten participating OMFS offices, post-operative handouts were given, which included the same study information as listed above, as well as a Quick Response (QR) code that patients could use to access the survey (**Appendix F**). The receptionist or staff member informed eligible patients of the study following their oral surgery procedure, and then the handout was given at which point they were asked to complete the survey at home only

once they had completed taking any pain medications. Patients were told to use a smartphone device to scan the QR code to gain access to the survey. Of the ten participating OMFS offices, three were able to use the original method for survey administration as described above, while seven offices used the QR code handouts for the survey distribution.

Participants who accessed the survey, either by the email link or QR code, first completed an online consent form before completing the survey (**Appendix G**). As an incentive for participating, patients received the option to be entered into a draw to win a weekly \$50 gift card following the completion of the survey.

2.4 Data Analysis

Following the survey administration period, survey data was collected from Qualtrics and transferred to Statistical Package for Social Sciences (SPSS) software version 29.0.1.0 (171), where all data analyses were conducted. The survey items that were identical to previously validated surveys served as historical controls to compare our data against, in which the responses to specific questions in the present survey were compared to findings from previous similar studies.

Descriptive statistics (univariate statistics: means and ranges) summarized patient characteristics associated with opioids prescribed following surgical procedures, including the opioids prescribed, pills taken, and pills left unused. The frequencies of responses regarding non-opioid pain management, information given on opioid storage and/or disposal, medication storage location, and medication disposal were also calculated.

The Fisher's Exact Test was used to analyze the perceived risk of prescription opioid diversion, and Chi-Square Tests compared disposal methods and knowledge of the potential risks associated with opioid prescription use between different subgroups based on 1) sex (male vs. female), 2) age (younger vs. older respondents), and 3) information provided or not following oral

surgical procedures. Binary multivariable logistic regression analyses were used to identify predictors of misuse of prescription opioid medications. The threshold for bivariate and multivariate analyses was set at $P < 0.05$. A limited number of variables were recoded to conduct bivariate and multivariable analyses. Sex (males vs. females) was used instead of gender due to missing responses from some of the gender categories (transgender and non-binary). Furthermore, survey questions that utilized a 5-point Likert scale ranging from strongly agree to strongly disagree were collapsed to include only agree, neutral, or disagree, to enable better recognition of trends in the dataset. For the same reason, responses that included “no opinion” or “no knowledge” were combined.

To assess the reliability of participant responses, an identical question was included twice in the questionnaire. The duplicate responses to the same question were compared with Cohen’s Kappa test.

Chapter 3: Results

The survey had a six-month recruitment period, from October, 2022, to March, 2023. A total of 177 youth patients from ten oral surgery offices completed the survey (**Table 3.1**). The mean patient age was 19.3 years (range: 15 to 24 years), and 58.2% of participants were women. Of all respondents, 97.7% underwent wisdom tooth/teeth extractions. The Cohen's Weighted Kappa score was 0.838 (95% confidence interval 0.737; 0.940), meaning there was an 83.8% agreement between the responses to a duplicate inquiry.

Table 3.1. Demographics of the study sample

SURVEY GENERAL QUESTIONS	Responses N (%)
Gender	
Man	67 (37.9)
Woman	103 (58.2)
Transgender	1 (0.6)
Non-binary	6 (3.4)
Age groups	
Younger age group (15-18 years)	71 (40.1)
Older age group (19-24 years)	106 (59.9)
What dental or oral surgical procedure did you undergo?	
Wisdom tooth/teeth extraction	173 (97.7)
Orthognathic surgery (jaw surgery)	4 (2.3)

3.1 Instructions for Over-The-Counter Pain Management

Study participants were asked if they were given instructions on how to manage post-operative pain after their procedures, and 97.7% of them indicated yes to this question (**Table 3.2**). These instructions included using over-the-counter (OTC) pain management when taking acetaminophen (91.2%), ibuprofen (87.6%), and/or naproxen (11.2%), and the participant responses were similar among the ten participating oral surgery offices (**Figure 3.1**). A total of

147 participants (83.5%) reported using at least one of these OTC medications to help alleviate their post-operative pain. There were no significant differences ($P=0.752$) among the ten participating oral surgery offices regarding instructions given for OTC pain management.

Table 3.2. Instructions given to patients for pain management following their oral surgical procedures

SURVEY QUESTIONS	Responses N (%)
After your procedure, were you given instructions on how to manage your pain?	
Yes	173 (97.7)
No	4 (2.3)
Did the instructions include using over-the-counter medications?	
Acetaminophen (Tylenol)	
Yes	155 (91.2)
No	9 (5.3)
I don't know	6 (3.5)
Ibuprofen (Advil, Motrin)	
Yes	149 (87.6)
No	14 (8.2)
I don't know	7 (4.1)
Naproxen (Aleve)	
Yes	19 (11.2)
No	116 (68.2)
I don't know	35 (20.6)
Did you use any of these over-the-counter medications to help manage your pain?	
Yes	147 (83.5)
No	22 (12.5)

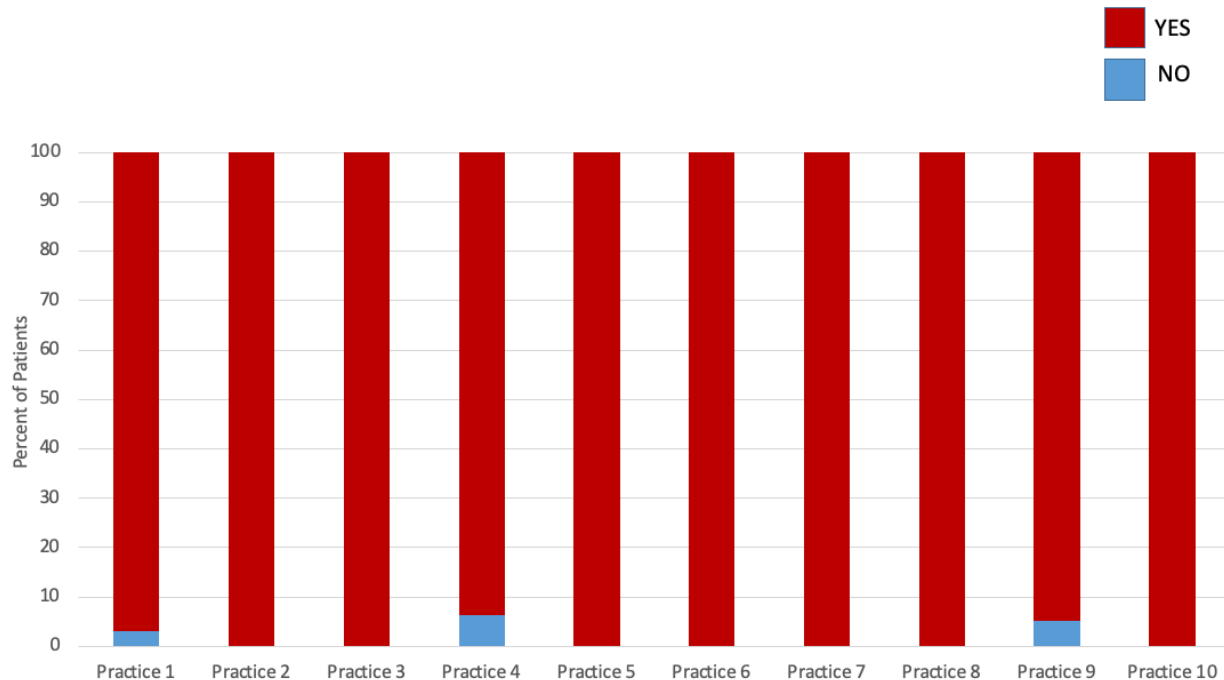


Figure 3.1. Instructions for OTC pain management among participating oral surgery practices. *Question: Did the instructions include using over-the-counter medications (Acetaminophen, Ibuprofen, Naproxen)?*

3.2 Post-Operative Prescription Opioid Use

Table 3.3 presents opioid prescription patterns, as well as patient post-operative prescription opioid use. Of the ten participating oral surgery offices, nine prescribed opioids to their youth patients (**Figure 3.2**). Approximately two-thirds (n=121) of participants were given a prescription for an opioid pain medication following their surgical procedures, of which 110 (90.9%) were prescribed Codeine (Tylenol #3). Among those who received an opioid prescription, 109 of them (90.1%) filled their prescriptions. There were a total of 2492 opioid pills prescribed (mean: 25.2 pills per participant, range: 2 to 45 pills).

Table 3.3. Post-operative prescriptions for opioid medications

SURVEY QUESTIONS	Responses N (%)
Were you given a prescription for pain medication to take after your surgical procedure?	
Yes	121 (68.4)
No	56 (31.6)
Which one?	
Codeine (Tylenol #3)	110 (90.9)
Oxycodone (Percocet, Oxycontin)	9 (7.5)
Morphine (MS Contin)	1 (0.8)
Other (please specify)	1 (0.8)
Did you get/buy this prescription?	
Yes	109 (90.1)
No	12 (9.9)
Did you take the prescription medication at the frequency and quantity as prescribed?	
Yes	68 (67.3)
No	33 (32.7)

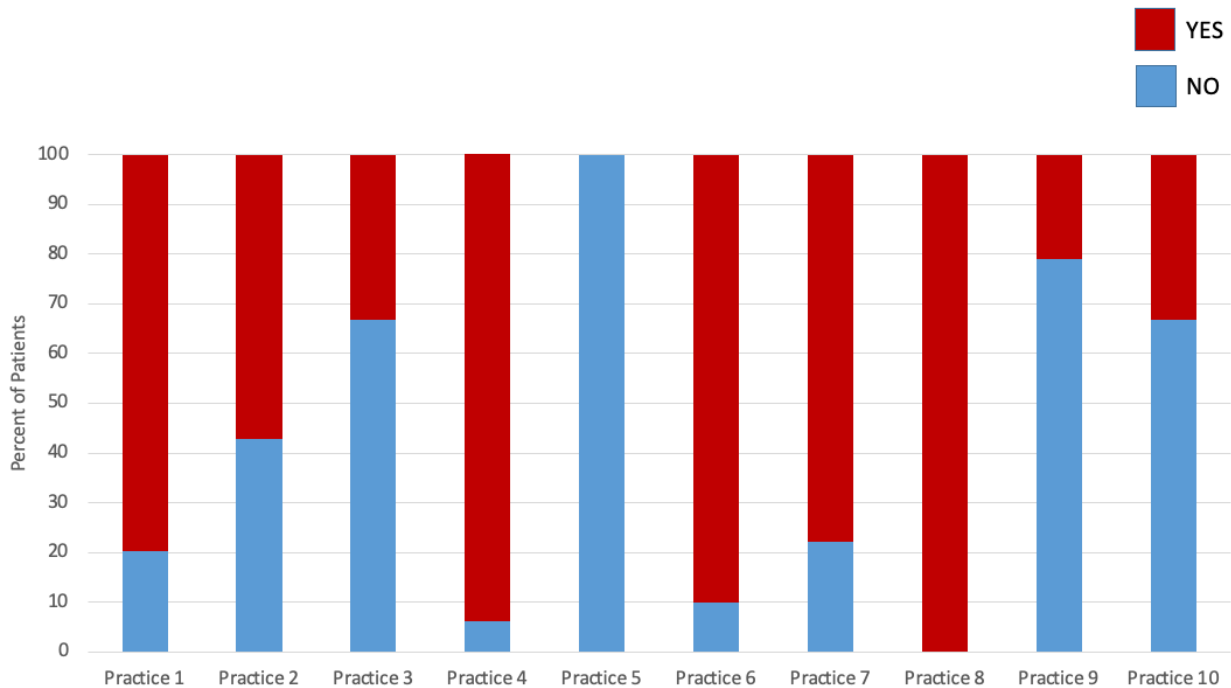


Figure 3.2. Opioid prescribing habits among participating oral surgery practices. *Question: Were you given a prescription opioid medication to take after your surgical procedure?*

3.3 Information Provided for Safe Prescription Opioid Use

Safe storage instructions were provided to 31 (30.7%) participants, and 18 (17.8%) were given information on proper disposal of opioids (**Table 3.4**). Approximately one-fourth of the respondents (n= 24) reported that no instructions were given, while 37 (36.6%) did not remember if information was provided or not. For participants that selected the answer “other” in regards to what information was provided, their responses included “*how to take it*”, “*how often to take it*”, “*when to take it*”, and “*to take it with food*”. Among patients who were provided information on safe storage, proper disposal, and/or use of opioids, 36 (35.6%) patients received information from one of the dental/healthcare professionals within the oral surgery teams, while 31 (30.7%) patients were provided information by pharmacists, and 25 (24.7%) patients were given information by both, dental/healthcare professionals in the office and pharmacists.

Table 3.4. Post-operative information provided to youth patients

SURVEY QUESTIONS	Responses N (%)
What information did you receive about prescription opioid medication use?	
How to store it	31 (30.7)
How to dispose of it	18 (17.8)
No instructions were given	24 (23.8)
I do not remember	37 (36.6)
Other (please specify)	17 (16.8)
Who provided the information to you?	
Healthcare professional	36 (35.6)
Pharmacist	31 (30.7)
Healthcare professional and a pharmacist	25 (24.7)
Parent	11 (10.9)
School and friends	3 (2.9)

3.4 Opioid Storage and Disposal Behaviour

Descriptive statistics for opioid storage and disposal-related patient behaviour is presented in **Table 3.5**. Among the participants who filled their opioid prescriptions, 52 (51.5%) of them stored their opioids in an open location, 47 (46.5%) stored them in a concealed location, and only 2 participants (2.0%) stored them in locked locations in their homes. Of those who did not store their opioids in a locked location, the most frequently reported reason (80.7%) for not doing so was because they were not worried about anyone taking their medications. Other noted reasons included believing that locking up the medication was inconvenient (22.0%), and/or they did not have access to a locked location (16.5%). Furthermore, 89 participants (89.0%) who did not securely store their opioid medications believed that there was no risk that their prescription medications could be used by someone else without their permission.

The Fisher's Exact Test compared patient-related perceived risk of opioid use regarding patient's age, sex, and whether post-operative information was provided or not (**Table 3.6**). Although there was a trend for older patients to perceive a higher risk of opioid diversion compared to younger patients (10% vs. 0%, respectively), this difference was not significant ($P=0.082$).

Table 3.5. Patient storage behaviour of prescription opioid medications

SURVEY QUESTIONS	Responses N (%)
Where did you store the prescription medication?	
Open location	52 (51.5)
Concealed location in my home	47 (46.5)
Locked location in my home	2 (2.0)
Indicate the reasons(s) why you did not store your prescription medication in a locked location:	
I am not worried about anyone taking my medication	88 (80.7)
I have no access to a locked location	18 (16.5)
I did not lock up my medication because this is inconvenient	24 (22.0)
Other reason not to lock medication	6 (5.5)
Do you believe there is any risk that the prescription medication kept in your home could be taken or used by someone else without permission?	
Yes	6 (6.0)
No	89 (89.0)
Not sure if there is risk or not of someone taking and using it	5 (5.0)

Table 3.6. Perceived risk of prescription opioid diversion in home: comparisons based on 1) age group, 2) sex, and 3) information provided following oral surgery procedures (*Question: Do you believe there is any risk that the prescription medication kept in your home could be taken or used by someone else without permission?*)

	Patient responses		P-value
	Yes N (%)	No N (%)	
Patient age groups			
15-18 years	0 (0.0)	35 (100.0)	0.082#
19-24 years	6 (10.0)	54 (90.0)	
Sex			
Males	2 (5.1)	37 (94.9)	1.000^
Females	3 (5.8)	39 (94.2)	
Information provided			
Yes	3 (7.5)	37 (92.5)	0.694^
No	3 (5.5)	52 (94.5)	

^ Chi-Square test; # Fisher's Exact Test

Table 3.7 outlines patient disposal behaviour for unused opioid pills. A total of 1,484 opioid pills were left unused (mean: 17.7 pills per participant, range: 2 to 30 pills). Of the 84

patients with leftover pills, 13 (15.5%) disposed of their opioids and 71 (84.5%) reported still having them. For respondents who kept their unused opioids, 33 (46.5%) reported saving it for future needs. Other reasons for not disposing of leftover pills included not being told about the need to dispose of them (19.7%), not knowing how to dispose of them (22.5%), and/or saving the medications for a family/friend (2.8%). For patients that selected “other” as a reason for not disposing of their unused prescription opioid medications, self-reported responses included, “*Since it’s a general painkiller, I’ll keep it and use it in the future*”, “*forgot I had it*”, “*I haven’t gotten around to getting rid of it yet*”, and “*I use them whenever I’m in unbearable amounts of pain caused by whatever and I see it as my emergency supply*”.

Table 3.7. Patient disposal behaviour of prescription opioid medications

SURVEY QUESTIONS	Responses N (%)
What did you do with any leftover pills from your prescription medication?	
I still have leftovers of the medication	71 (84.5)
I disposed of the medication	13 (15.5)
Please indicate the reason(s) why you did not dispose of your unused prescription medications:	
Save it for future need	33 (46.5)
Not told that I need to dispose it	14 (19.7)
Do not know how to dispose it	16 (22.5)
Saving this medication for family/friend because they might need it	2 (2.8)
Other reasons (specified)	16 (22.5)

Pearson Chi-Square tests analyzed opioid-related disposal behaviour based on patient age, sex, and whether post-operative information was provided by healthcare professionals or not (**Table 3.8**). Among the low number of participants who disposed of their leftover opioid pills, there were no significant age-, sex-, or information-related differences.

Table 3.8. Disposal behaviour: comparisons based on 1) age group, 2) sex, 3) information provided following oral surgery procedure. *Q: What did you do with any leftover pills from your prescription medication?*

	Still having leftover pills, Responses N (%)	Disposed of unused pills, Responses N (%)	P-value#
Patient age groups			
15-18 years	28 (80.0)	7 (20.0)	0.966
19-24 years	43 (79.6)	11 (20.4)	
Sex			
Males	24 (72.7)	9 (27.3)	0.168
Females	45 (84.9)	8 (15.1)	
Information provided			
Yes	29 (76.3)	9 (23.7)	0.483
No	42 (82.4)	9 (17.6)	

Pearson Chi-Square test

3.5 Beliefs About Prescription Opioid Use

Patient beliefs about prescription opioid use are presented in **Table 3.9**. Of the youth participants who completed the survey, 71 (45.8%) believed that prescription opioid medications are safe to use because they are being prescribed by healthcare professionals. Furthermore, the majority (58.7%) of participants agreed that they were less likely to get into trouble using prescription opioid medications as compared to using other non-prescribed substances. Overall, participants were neutral (54.2%) about opioids being less expensive, and generally disagreed (62.6%) that opioids are more accessible to get compared to alcohol and other drugs.

Table 3.9. Youth beliefs about prescription opioid use

Patient beliefs about prescription opioid use	Levels of Agreement		
	Agree N (%)	Neutral N (%)	Disagree N (%)
Safer because prescribed ^a	71 (45.8)	27 (17.4)	57 (36.8)
Less likely to get into trouble ^a	91 (58.7)	29 (18.7)	35 (22.6)
Less expensive ^a	43 (27.8)	84 (54.2)	28 (18.0)
Easier to get ^a	19 (12.2)	39 (25.2)	97 (62.6)

^aAs compared to alcohol and other drugs

Table 3.10 compares younger and older patients and two sexes regarding the agreement to several statements about prescription opioid use. Compared to females, males were significantly ($P=0.006$) more likely to agree that prescription opioids are safer because they are prescribed by healthcare professionals and believed that they were less likely to get into trouble using them compared to alcohol and other drugs ($P=0.046$). Furthermore, more males than females believed that prescription opioids are less expensive ($P=0.040$) and easier to get ($P=0.023$). There were no age-related significant belief-associated differences in prescription opioid medication use.

Table 3.10. Youth beliefs about prescription opioid use: comparisons based on 1) age group, 2) sex

A. Agreement with the statement: “Prescription medications are safer than alcohol or other drugs because they are prescribed by health professionals”

	Agree N (%)	Neutral N (%)	Disagree N (%)	P-value#
Patient age group				
15-18 years	32 (51.6)	12 (19.4)	18 (29.0)	0.264
19-24 years	39 (41.9)	15 (16.1)	39 (41.9)	
Sex				
Males	36 (61.0)	7 (11.9)	16 (27.1)	0.006
Females	31 (34.4)	19 (21.2)	40 (44.4)	

Pearson Chi-Square test

B. Agreement with the statement: “I am less likely to get into trouble using prescription medications than alcohol and other drugs”

	Agree N (%)	Neutral N (%)	Disagree N (%)	P-value#
Patient age group				
15-18 years	37 (59.7)	12 (19.4)	13 (21.0)	0.924
19-24 years	54 (58.1)	17 (18.3)	22 (23.7)	
Sex				
Males	41 (69.5)	8 (13.6)	10 (16.9)	0.046
Females	44 (48.9)	21 (23.3)	25 (27.8)	

Pearson Chi-Square test

C. Agreement with the statement: “Prescription medications are less expensive than alcohol or other drugs”

	Agree N (%)	Neutral N (%)	Disagree N (%)	P-value#
Patient age group				
15-18 years	13 (21.0)	39 (62.9)	10 (16.1)	0.185
19-24 years	30 (32.3)	45 (48.4)	18 (19.4)	
Sex				
Males	22 (37.3)	32 (54.2)	5 (8.5)	0.040
Females	21 (23.3)	49 (54.4)	20 (22.3)	

Pearson Chi-Square test

D. Agreement with the statement: “Prescription medications are easier to get than alcohol and other drugs”

	Agree N (%)	Neutral N (%)	Disagree N (%)	P-value#
Patient age group				
15-18 years	11 (17.7)	16 (25.8)	35 (56.5)	0.205
19-24 years	8 (8.6)	23 (24.7)	62 (66.7)	
Sex				
Males	13 (22.0)	14 (23.7)	32 (54.2)	0.023
Females	6 (6.7)	25 (27.8)	59 (65.5)	

Pearson Chi-Square test

3.6 Perceived Risks and Prevalence of Prescription Opioids for Non-Medical Use

Findings of the descriptive analyses regarding perceived risks of non-medical use of prescription opioid medications is presented in **Table 3.11**. When opioids are taken *once or twice* for non-medical purposes, the majority of respondents believed that there is at least some risk due to the use of prescription opioid medications, with most of them reporting slight to moderate risk. Moderate risk was perceived for *occasional* misuse of opioids by less than half of the participants (48.4%), and significant risk was associated with *regular* use by the majority of the patients (73.2%).

Table 3.11. Patient perceived risks regarding non-medical prescription opioid use

Frequency of opioid use	Patient Perceived Risks ^a				
	No risk N (%)	Slight risk N (%)	Moderate risk N (%)	Great risk N (%)	Not sure N (%)
Trying prescription opioid medications once or twice	5 (3.3)	50 (32.7)	52 (34.0)	34 (22.2)	12 (7.8)
Using prescription medications occasionally (more than once or twice)	1 (0.7)	24 (15.7)	74 (48.4)	49 (32.0)	5 (3.3)
Using prescription opioid medications regularly (3-4 times a week)	3 (2.0)	4 (2.6)	30 (19.6)	112 (73.2)	4 (2.6)

^aFor non-medical reasons (opioid drug use without a prescription or for reasons other than those indicated by a doctor)

In general, youth respondents believed that it is relatively common for people to take opioid medications to relieve pain without a doctor telling them to do so (46.4%), to relax/have fun/get high (40.5%), or possibility to become addicted (49.0%) (**Table 3.12**). Findings of the bivariate analyses are presented in **Table 3.13**, where one can see that there were no significant age or sex-related differences in the perceived prevalence of non-medical opioid use.

Table 3.12. Patient awareness of the perceived prevalence of non-medical opioid use

SURVEY QUESTIONS	Perception of Perceived Prevalence for Specific Opioid Uses				
	Rare N (%)	Neither rare, nor common N (%)	Common N (%)	No opinion N (%)	No knowledge N (%)
How common do you think it is for people like you to take prescription opioid medications in order to relieve pain without a doctor telling them to do so?	40 (26.2)	25 (16.3)	71 (46.4)	2 (1.3)	15 (9.8)
How common do you think it is for people like you to take prescription opioid medications (no doctor's prescription) in order to relax/have fun/get high (not primarily to relieve pain)?	48 (31.4)	18 (11.8)	62 (40.5)	2 (1.3)	23 (15.0)
How common do you think it is for people like you to become addicted to prescription opioids?	44 (28.8)	23 (15.0)	75 (49.0)	1 (0.7)	10 (6.5)

Table 3.13. Patient perceived prevalence of non-medical opioid use: comparisons based on 1) age group, 2) sex

*Question: How common do you think it is for people like you to take prescription opioid medications in order to **relieve pain** without a doctor telling them to do so?*

Predictors	Patients' Perceived Prevalence				P-values#
	Rare N (%)	Neither rare, nor common N (%)	Common N (%)	No opinion or knowledge N (%)	
Patient age group					
15-18 years	18 (29.5)	11 (18.0)	23 (37.7)	9 (14.8)	0.344
19-24 years	23 (24.7)	14 (15.1)	48 (51.6)	8 (8.6)	

Sex					
Males	21 (36.2)	8 (13.8)	23 (39.7)	6 (10.3)	0.311
Females	20 (22.2)	14 (15.6)	46 (51.1)	10 (11.1)	

Pearson Chi-Square test

*Question: How common do you think it is for people like you to take prescription opioid medications (no doctor's prescription) in order to **relax/have fun/get high** (not primarily to relieve pain)?*

Predictors	Rare N (%)	Neutral N (%)	Common N (%)	No opinion or knowledge N (%)	P-value#
Patient age group					0.372
15-18 years	16 (26.2)	10 (16.4)	24 (39.3)	11 (18.0)	
19-24 years	33 (35.5)	8 (8.6)	38 (40.9)	14 (15.1)	
Sex					0.284
Males	20 (34.5)	7 (12.1)	19 (32.8)	12 (20.7)	
Females	24 (26.7)	11 (12.2)	43 (47.8)	12 (13.3)	

Pearson Chi-Square test

*Question: How common do you think it is for people like you to become **addicted** to prescription opioids?*

Predictors	Rare N (%)	Neutral N (%)	Common N (%)	No opinion or knowledge N (%)	P-value#
Patient age group					0.210
15-18 years	14 (23.0)	8 (13.1)	32 (52.5)	7 (11.5)	
19-24 years	31 (33.3)	15 (16.1)	43 (46.2)	4 (4.3)	
Sex					0.517
Males	20 (34.5)	9 (15.5)	24 (41.4)	5 (8.6)	
Females	24 (26.7)	13 (14.4)	48 (53.3)	5 (5.6)	

Pearson Chi-Square test

3.7 Predictors of Misuse

Two multivariate regression analyses were performed to identify: 1) potential predictors of risks related to prescription opioid medication misuse and 2) potential predictors of beliefs related to prescription opioid medication misuse.

Three multivariate logistic regression models tested potential predictors of risks related to prescription opioid medication misuse (**Table 3.14, models 1-3**). Model 1 tested the risks related to non-medical prescription opioid use when taken *once or twice*, model 2 the risks of prescription opioids when used *occasionally* for non-medical reasons, and model 3 the risks associated with *regular* non-medical prescription opioid use. The potential predictors tested in all three models were sex, age group, and information provided or not by health professionals. To enable multivariate testing of categorical predictors comprising more than two values (response categories), three dummy variables were created as follows; dummy 1: no opinion/knowledge vs. rare, dummy 2: no opinion/knowledge vs. neither, and dummy 3: no opinion/knowledge vs. common.

The overall regression **model 1** (outcome: perceived risk if prescription opioids are used *once or twice* for non-medical reasons) was significant ($P=0.026$), and this model's predictors jointly explained 17% (Nagelkerke R Square= 0.17) of the variation in the outcome variable. In this model 1, the only significant predictor ($OR=0.2$; 95% CI 0.1; 0.8) was the knowledge difference between the patients who had no opinion/knowledge regarding the prevalence of non-medical prescription opioid use and those who perceived the prevalence of non-medical prescription opioid use to be rare.

The overall model 2 was also significant ($P=0.047$), and the predictors jointly explained 18% (Nagelkerke R Square=0.18) of the variation of the outcome: perceived risks related to

prescription opioids when taken *occasionally* for non-medical use. Regarding individual predictors, when males were compared to females, there was a greater likelihood for females to perceive high risk of harm when, although this association, when controlled for other predictors of the model, was not significant ($P=0.086$).

The overall regression **model 3** (outcome: perceived risk if prescription opioids are used *regularly* for non-medical reasons) was also significant ($P=0.035$), and showed sex to be the only significant predictor ($P=0.040$). This model's predictors jointly explained 28% (Nagelkerke R Square=0.28) of the variation in the outcome variable. However, when prescription opioids are taken *regularly* for non-medical use, females were significantly (OR= 10.1; 95% CI 1.1; 92.6) more likely to perceive a high risk of harm compared to males. Although the older age group showed trends of perceiving a higher risk of harm compared to the younger age group, this predictor was not significant ($P=0.101$) when controlled for other predictors of the model.

Table 3.14. Predictors of misuse based on perceived risks regarding non-medical prescription opioid use

INDIVIDUAL PREDICTORS	Model 1 summary:	
	Outcome: Perceived risk of opioids when used once or twice ^a P= 0.026; Nagelkerke R Square= 0.17#	
	Significance	AOR (95% CI)
Sex (males vs. females)	0.585	0.8 (0.3-1.9)
Age group (younger vs. older)	0.264	0.6 (0.2-1.5)
Information provided (yes vs. no)	0.258	0.6 (0.2-1.5)
No opinion/knowledge vs. rare ^b	0.031	0.2 (0.1-0.8)
No opinion/knowledge vs. neither ^b	0.294	0.4 (0.1-2.3)
No opinion/knowledge vs. common ^b	0.885	0.9 (0.2-4.3)

INDIVIDUAL PREDICTORS	Model 2 summary:	
	Outcome: Perceived risk of opioids when used occasionally ^a P= 0.047; Nagelkerke R Square= 0.18#	
	Significance	AOR (95% CI)
Sex (males vs. females)	0.086	0.4 (0.1-1.1)
Age group (younger vs. older)	0.853	1.1 (0.4-3.1)
Information provided (yes vs. no)	0.505	1.5 (0.5-4.7)
No opinion/knowledge vs. rare ^b	0.309	0.4 (0.1-2.2)
No opinion/knowledge vs. neither ^b	0.647	1.6 (2.3-10.0)
No opinion/knowledge vs. common ^b	0.304	2.4 (0.5-12.4)

INDIVIDUAL PREDICTORS	Model 3 summary:	
	Outcome: Perceived risk of opioids if used regularly ^a P= 0.035; Nagelkerke R Square= 0.28#	
	Significance	AOR (95% CI)
Sex (males vs. females)	0.040	10.1 (1.1-92.6)
Age group (younger vs. older)	0.101	0.2 (0.1-1.5)
Information provided (yes vs. no)	0.678	1.6 (0.2-12.9)
No opinion/knowledge vs. rare ^c	0.842	1.3 (0.1-20.5)
No opinion/knowledge vs. neither ^c	0.613	2.2 (0.1-47.1)
No opinion/knowledge vs. common ^c	0.184	7.6 (0.4-153.9)

Multivariable binary logistic regression; AOR- Adjusted Odds Ratio; CI- Confidence Interval

^aFor non-medical reasons (opioid drug use without a prescription or for reasons other than those indicated by a doctor); ^bPerceived prevalence of non-medical prescription opioid use in order to relieve pain

Table's 3.15, models 1-2 present results of multivariate logistic regression models that tested potential predictors of beliefs related to prescription opioid medication misuse. Model 1 tested predictors related to the belief that prescription opioids are safer than alcohol and other drugs

because they are prescribed by a healthcare professional, and model 2 the belief of patients thinking to be less likely to get into trouble using prescription opioids compared to alcohol and other drugs. The same predictors, as above, were studied for other outcomes and their results are presented in Table's 3.15, models 1-2.

The overall regression **model 1** (outcome: belief of prescription opioids being safer because they are prescribed) was significant ($P=0.043$), and this model's predictors jointly explained 13% (Nagelkerke R Square= 0.13) of the variation in the model's outcome. In this model, sex was the only significant predictor ($P=0.003$), where males as compared to females were significantly ($OR=0.3$; 95% CI 0.1; 0.7) more likely to agree that prescription opioids are safer because they are prescribed by healthcare professionals.

The overall regression **model 2** (outcome: belief of being less likely to get into trouble using prescription opioids) was non-significant ($P=0.294$), and this model did not have any significant individual predictors.

Table 3.15. Predictors of opioid misuse based on patient beliefs about prescription opioid use

INDIVIDUAL PREDICTORS	Model 1 summary:	
	Outcome: Beliefs- opioids are safer because prescribed ^a P= 0.043; Nagelkerke R Square= 0.13#	
	Significance	AOR (95% CI)
Sex (males vs. females)	0.003	0.3 (0.1-0.7)
Age (younger vs. older)	0.175	0.6 (0.3-1.3)
Information provided (yes vs. no)	0.165	0.5 (0.2-1.3)
No opinion/knowledge vs. rare ^a	0.401	0.5 (0.1-2.6)
No opinion/knowledge vs. neither ^a	0.637	0.7 (0.1-3.7)
No opinion/knowledge vs. common ^a	0.445	0.5 (0.1-2.6)

INDIVIDUAL PREDICTORS	Model 2 summary:	
	Outcome: Beliefs- less likely to get into trouble as compared to alcohol and other drugs ^a P= 0.294; Nagelkerke R Square= 0.09#	
	Significance	AOR (95% CI)
Sex (males vs. females)	0.094	0.5 (0.2-1.1)
Age (younger vs. older)	0.948	0.9 (0.4-2.3)
Information provided (yes vs. no)	0.443	0.7 (0.3-1.8)
No opinion/knowledge vs. rare ^a	0.366	2.1 (0.4-10.3)
No opinion/knowledge vs. neither ^a	0.758	1.3 (0.3-6.6)
No opinion/knowledge vs. common ^a	0.904	0.9 (0.2-3.6)

Multivariable binary logistic regression; AOR- Adjusted Odds Ratio; CI- Confidence Interval

^aPerceived prevalence of non-medical prescription opioid use in order to relieve pain

Chapter 4: Discussion

In the current study, 173 participants (97.7%) ages 15 to 24 underwent wisdom tooth extraction. Current opioid prescribing habits showed that nine of ten participating oral surgeons within BC prescribed opioids, with the number of pills prescribed (mean: 25.2 pills per participant) exceeding current prescription guidelines. Although nearly all participants reported receiving instructions for use of non-opioid medications such as acetaminophen and ibuprofen, approximately 70% were still given an opioid prescription by the oral surgeon to manage their post-operative pain. The present study corroborates existing literature that has demonstrated a trend for OMFS to routinely over-prescribe opioid analgesics for acute post-operative pain management despite research and evidence-based guidelines emphasizing use of non-opioid medications [51,54,56]. In the current study, there was a total of 1,484 unused, excess opioid tablets. The majority of youth participants taking prescription opioids did not receive storage and/or disposal information, resulting in medications not being securely stored (98%) and only a low disposal rate (15.5%) of unused opioids. Approximately half (46.5%) of the participants who kept leftover pills reported “*saving them for future need*”.

Furthermore, there was a general lack of knowledge among study participants about prescription opioids. Males were found to have a higher propensity for opioid misuse when compared to females. Overall, youth ages 15 to 24 undergoing oral surgery procedures, primarily third molar removal, are not well informed of the potential risks associated with prescription opioids. This lack of knowledge has the potential to translate into an increased risk of misuse and diversion with leftover, undisposed opioid pills.

The cause of the current opioid crisis is multifactorial. Although most deaths attributed to opioid overdoses are primarily related to fentanyl and its analogues, the burden of risks associated

with prescription opioids cannot be disregarded [60]. Short-term use of low-potency prescription opioids prescribed following third molar removal (i.e. codeine) may lead to long-term dependence and potential misuse and diversion. Nalliah *et al.* (2020) investigated patient-reported post-operative pain levels between opioid users and non-opioid users following dental extractions, either after surgical or routine extraction [73]. Of the 329 patients surveyed, 80 patients (51.6%) who underwent surgical extraction and 68 patients (39.1%) who underwent routine extractions used opioids following their procedures. The findings demonstrated that patients who used opioids post-operatively reported significantly higher levels of pain compared to those who used non-opioid medications (i.e. acetaminophen, ibuprofen), irrespective of extraction type (surgical extraction group: 51 (64.6%) vs. 34 (45.3%), $P < 0.001$; routine extraction group: 44 (64.8%) vs. 35 (33.1%), $P < 0.001$). These findings not only support the current guidelines recommending non-opioid analgesics for first-line treatment in dental extractions, but also provide additional evidence for the efficacy of non-opioid analgesics in managing post-operative dental pain. Therefore, from a risk-benefit standpoint, perhaps no real benefit for opioids exists, particularly for most patients undergoing uncomplicated, routine dental extractions. Assessment of the expected intensity and duration of post-operative pain based on the procedure and the individual patient's medical history and pain threshold can allow patients to make a more informed decision on whether an opioid is necessary or not [73]. This is particularly important for youth patients, as oral surgery procedures are often their first exposure to opioids and their inherent risks. It is prudent for OMFS to continually reassess their opioid prescribing habits, and individualize opioid prescriptions when required. This practice may reduce the number of opioid prescriptions and address the ongoing opioid crisis. It is necessary to consider the needs of each patient, and engage in more reasonable, not simply less, opioid prescribing practices.

In situations where prescription opioid analgesics are appropriate, such as severe acute post-operative pain, clinicians should educate patients and provide information on opioid use, storage, and disposal. The consequences of improper storage and/or disposal should also be communicated to patients. In the present study, there was a low proportion of youth participants taking prescription opioids who reported receiving storage and/or disposal information. Only 30.7% of participants reported that they were given information on proper storage, and 17.8% reported that instructions were given on the disposal of unused pills, while 23.8% reported that no instructions were provided on appropriate storage or disposal of opioid medications. Even for those who were provided storage instructions they still did not follow these instructions, as only 2% of all participants stored their opioids safely in locked locations. Furthermore, 84.5% of participants with unused pills kept them, resulting in a total of 1,484 opioid pills left unused. These findings are consistent with Gregorian *et al.* (2020), who evaluated the knowledge, practices, and beliefs of patients receiving prescription opioids regarding opioid storage and disposal [66]. Of 500 participants, 35.2% received safe opioid storage information, 31.4% received disposal counselling, and 50.0% reported that no instructions were given from healthcare providers. However, unlike the present study, Gregorian *et al.* (2020) found that patients who received proper storage information were more likely to keep their medications in a locked location compared to those who did not receive such information (42.4% vs. 12.4%, $P < 0.001$). The present study supports existing literature, both of which reinforce the need for widespread improvement in patient education practices regarding proper storage and disposal of prescription opioids.

Previous studies demonstrated the effectiveness of patient education initiatives on proper opioid storage and disposal behaviour [74–76]. For example, Rose *et al.* (2016) study examined the efficacy of providing patients with an opioid-related information pamphlet post-operatively on

storage and disposal practices [75]. They concluded that opioid disposal rates increased significantly in those who received the pamphlet, but noted no improvement in opioid storage. A similar, prospective study was conducted by Hasak *et al.* (2018), which evaluated the effectiveness of unused opioid disposal following dissemination of an educational brochure [74]. Of the 334 patients included in this study, a significant increase in disposal rate was seen amongst patients who received the brochure (11% vs. 22%, respectively). They concluded that an easily implemented intervention, such as providing a brochure, led to improving disposal of unused opioids. Moreover, de la Cruz *et al.* (2017) found that the use of educational material was associated with improved patient-reported safe opioid use, storage, and disposal [76]. Interestingly, the Institute for Safe Medication Practices (ISMP) Canada has created a fact sheet that highlights frequently asked questions regarding opioid use to manage pain after surgery, short-term pain, and following wisdom tooth removal [77]. This fact sheet includes information on proper opioid use, its potential side-effects, storage, and disposal instructions. Although this fact sheet exists, it is still not widely used. Given the reported success of educational interventions in the literature, comprehensive dissemination of prescription opioid storage and disposal information in OMFS offices will likely lead to improved opioid knowledge, beliefs, and behaviour of patients who are prescribed opioids. In addition, if incentives are offered to patients to return unused opioids, there may be an increase in appropriate disposal rates. Furthermore, the timing of providing post-operative information should be considered, as this may influence retention rate amongst youth patients. Although this was not assessed in the current study, it would be important to note differences in storage and/or disposal behaviour in patients who received patient education during the consultation, pre-operatively on the day of the procedure, or post-operatively. It may also be prudent to implement comprehensive pre-operative counselling, taking advantage of opportunities

to provide information about safe opioid use, and delivering such information when a patient is more attentive to the instructions given.

Patients encounter various healthcare professionals who are involved in their post-operative care. Given pharmacists' role in dispensing opioid prescriptions, they may be considered an important professional link between opioid prescribers and the patients. Therefore, pharmacists are in a unique position to provide effective opioid stewardship, described by the Canadian Pharmacists Association as a series of interventions intended to promote safe and effective opioid use while concurrently reducing adverse outcomes associated with their use and misuse [78,79]. The existing literature surrounding prescription opioid dispensing among community-based pharmacies focuses on strategies to identify patients who may be at increased risk of opioid-related harms [80]. This includes the implementation of screening tools for identifying risk factors of opioid misuse, such as medication history, prior substance use, multiple prescribers, and prescription frequency [81,82]. There has also been substantial attention on harm reduction protocols such as pharmacy-based Naloxone distribution for opioid overdose and prescribing methadone for OUD [83]. Although essential, these strategies and protocols may be ineffective for youth patients, such as those included in the current study, since the majority of them would be first-time opioid users. As previously stated, only 30.7% of youth participants reported receiving information regarding safe opioid storage and/or disposal from pharmacists. It is possible that the majority of youth patients did not receive information regarding safe opioid use from pharmacists as they might have been deemed "low risk" based on current assessment tools. However, suppose pharmacists were to provide comprehensive information to all patients, regardless of risk level. In that case, it is likely that more youth in the current study would have stored and disposed of leftover opioid pills more appropriately.

There is insufficient research that focuses on strategies to properly educate first-time opioid users, specifically youth patients [82]. Further research is needed to improve current risk assessment strategies so that adequate information on safe opioid use is provided to all patients during opioid dispensing, with particular attention focused on first-time opioid users who still have not shown risks for opioid misuse.

In addition to opioid storage and disposal practices, it is evident that youth patients are unaware of the potential risks of misuse and diversion of prescription opioids. In the present study, there was an extremely low self-perceived risk that the prescribed opioids could be used by someone else without permission (6%). This belief may have contributed to only 2% of patients storing their prescription opioids securely in a locked location. Notably, an additional concern is that many participants intentionally kept unused opioid pills as an “*emergency supply*” or for future needs. This finding is consistent with that of Buffington *et al.* (2019) study, which found that the most common motivator for retaining unused prescription opioids was the desire to have a supply in the event of a future episode of pain [84]. These findings highlight a general lack of understanding of the risks associated with retaining unused prescription opioids. One might speculate that if healthcare professionals better communicated potential risks of prescription opioid use, patients would be more willing to properly dispose of unused pills, or better yet, not fill the prescription at all unless other forms of pain management were ineffective.

The current study highlights the misconception of youth’s low perceived risk of harm for low levels of opioid misuse. The majority of patients (73.4%) reported that they were aware that there is at least some risk with prescription opioid medications when used *regularly* for non-medical reasons. However, this awareness decreased significantly when considering opioid medications taken for non-medical reasons *occasionally* (i.e. taken only once or twice). This may

indicate that youth participants are unaware of the potential risks of infrequent opioid use for non-medical purposes. The present study demonstrates that youth patients believe that opioids carry risk only when taken regularly, but are unfortunately unaware that even if opioids are taken only occasionally, there are still risks associated with their consumption. Importantly, these troubling findings support previous research demonstrating that low perceived harmfulness is an indicator for misuse and risk factor for future non-medical use of prescription opioids among youth [64,68]. Additionally, it is of concern that the majority of participants (75%) believed that they are less likely to get into trouble using prescribed medications, and that prescription opioids are safer than alcohol or other drugs because they are prescribed by healthcare professionals (64%). These false perceptions reflect their viewpoints that medications provided by healthcare providers are somehow less harmful compared to those acquired from illicit sources. This also underscores a lack of understanding of prescription medication risks. Youth patients should recognize that prescription opioids have the same risks as non-prescription opioids, regardless of whether it is prescribed by a healthcare professional or not. A patient's first exposure to prescription opioids, such as that in this study following an oral surgical procedure, is a clear opportunity to facilitate patient education and correct false perceptions among youth regarding opioid risks.

Furthermore, misconceptions surrounding prescription opioid use were significantly higher in males compared to females, and found male sex to be a predictor of opioid misuse. This is consistent with previous literature, showing significantly higher rates of substance use disorder among males compared to females [39,85–87]. A recent study by Silver *et al.* (2020) found that although females are more likely to report prescription opioid use, males are significantly more likely to report prescription opioid misuse and dependence [39,85,88]. The authors suggested that this disparity may be linked to males' overall increased risk of illicit drug use and masculinity

norms that encourage risk-taking [88]. Furthermore, Osborne *et al.* (2017) conducted a cross-sectional survey among 10,965 youth ages 10 to 18 to identify risk factors influencing non-medical opioid use. Among the 3.2% (n=345) youth participants who reported non-medical use, the majority were males (55.7%) [87]. These studies support the finding that males are more vulnerable to adverse opioid-related outcomes compared to females. Additional research aimed at identifying other potential predictors among youth is warranted.

Chapter 5: Conclusions

Although prescription opioids may be indicated in managing severe post-operative dental pain, they also carry significant risks that should be understood by treating clinicians and patients receiving opioid prescriptions. In the current study, the majority of youth participants received opioid prescriptions following their oral surgical procedures. Only a small proportion of youth patients taking prescription opioids received information about their storage and/or disposal, and, as a result, the majority of patients did not securely store their prescription opioids or dispose of unused tablets. Responses from the current study reflected findings from previous studies, reporting a common lack of knowledge and low perceived harmfulness observed among youth patients. Youth's erroneous beliefs were significantly higher in males as compared to females, and male sex was also a significant predictor of opioid misuse. Taken together, the current study demonstrates that youth ages 15 to 24 are not well informed of the potential risks associated with prescription opioid use. If youth are to be prescribed and gain access to opioids following oral surgery procedures, then it is necessary to better educate this patient population regarding the potential risks of prescription opioid use and its potential for adverse health outcomes.

5.1 Study Strengths

Previous literature has demonstrated that the opioid crisis significantly impacts youth, however there is limited research that focuses on this population. The current study investigated information gaps about opioid prescriptions that exist within the youth population- the majority of whom received prescription opioid medications following their oral surgical procedures. Understanding the current knowledge and perspectives of patients ages 15 to 24 on prescription opioids offers insight into the reason why youth may be significantly impacted by adverse outcomes associated with opioid use. Due to the indication of prescription opioids to treat chronic

pain (cancer and non-cancer), many previous studies focused on chronic pain patient populations, with few investigating acute pain management. The current study addressed this gap by explicitly focusing on post-operative acute dental pain, in most of such cases, pain lasts no longer than seven days. Lastly, the sample included in the present study consisted of patients residing in BC, which represents the Canadian province most impacted by the opioid crisis. Therefore, focusing our research on this geographical location may provide insight into the perceptions of those most at risk for future opioid misuse and diversion.

5.2 Study Limitations

Although there are several implications in the present study, it is important to acknowledge limitations as well. First, the current study relied upon recruitment done by OMFS staff from ten participating oral surgery offices. Although youth representation was increased through the inclusion of numerous OMFS offices, it is still possible that our sample was not fully representative (potential selection bias) of the entire BC youth population receiving opioids, therefore limiting generalizability of results (study's external validity). Second, the relatively small sample did not allow for further statistical sub-analyses. Additionally, missing responses in some gender categories resulted in using participants' sex (males vs. females) for the binary and multivariate regression analyses rather than categorizing participants by all gender-related groups. Therefore, participants who did not identify as a man or woman were excluded from these analyses. In the future, a different option for gender nomination, "other", should also be included. Third, although the survey was anonymous, the sensitivity surrounding the topic of opioids may have resulted in potential social desirability bias, where some patients may have feared being judged and as a result provided at least partly dishonest answers. Nevertheless, our findings illustrated that even if some youth participants selected a more favourable answer, the overall knowledge and behaviour

surrounding prescription opioids is still lacking. Fourth, participants were instructed to complete the survey only after they used pain medications, which may have been five to seven days after their surgical procedures. Given this delay, recall bias may have influenced survey responses, as patients may have forgotten instructional details or inaccurately recalled them. Similarly, it is possible that a parent or guardian was present with the youth patient on the day of the procedure, who may have received the instructions rather than the youth patient themselves. It should be noted that in sedated patients having intravenous moderate or deep sedation, anterograde amnesia is likely to result in the patient failing to recall post-operative instructions later. Similarly, inherent anxiety in the conscious patient undergoing third molar surgery might also affect the patient's recall of post-operative instructions.

5.3 Study Implications and Recommendations to Consider

While patient care should always be individualized, healthcare providers need to consider that the risk for opioid misuse and diversion is high for all patients. Therefore, the treating clinician should have an armamentarium of different pain management protocols that maximize patients' wellbeing and effectively manage pain without routinely prescribing opioids. As stated in the current prescription guidelines, this includes recommending a combination of acetaminophen and ibuprofen, and prescribing opioids only when indicated.

It is evident from the current study that there was a lack of consistent dissemination of storage and/or disposal instructions provided to youth patients undergoing oral surgery procedures. It is suggested that all healthcare providers interacting with patients who have been prescribed opioids have a responsibility to inform and educate patients on proper opioid use, as well as their storage and disposal. Increased patient awareness and education efforts are required to improve storage and disposal practices, with an underlying goal of reducing the number of unused opioids

that have the potential for future misuse and diversion. Educational tools (i.e. brochures and pamphlets) may be implemented to facilitate proper opioid storage and disposal.

The findings of the present study demonstrated that even when disposal information was provided to youth, their disposal practices were still unsatisfactory. This lack of compliance requires special attention to explore alternative strategies to reduce the number of unused opioid pills and encourage the proper disposal of unused pills. For example, requesting a partial fill of an opioid prescription may result in fewer leftover medications. This may be a good alternative for patients who underwent uncomplicated, routine dental extractions where the duration of post-operative pain is expected to be minimal or patients with high pain thresholds that suspect an opioid analgesic may not be required but want to have it “just in case”. This may reduce the number of opioid fills. Alternatively, having disposal kiosks in more convenient locations that patients more frequently visit, rather than exclusively relying on pharmacies, may also encourage proper disposal of unused pills. Another strategy might be incentivizing opioid disposal.

5.4 Future Research Directions

Addressing the need to revisit current opioid prescribing patterns following the prescribing guidelines is required. Although the focus of the present study was on youth patients and not on healthcare professionals, we found that the majority of participating OMFS did prescribe opioids to their youth patients following third molar removal. Identifying characteristics of OMFS, such as demographics, age, and education history, may help to distinguish trends contributing to under- or over-prescribing habits. For example, it may be possible that older OMFS are prescribing more opioids compared to younger OMFS, as more recent prescribing guidelines may have been developed and more broadly discussed as well as implemented during younger OMFS’ residency training. Moreover, OMFS practising in rural areas may prescribe opioids more frequently due to

limited access to other resources to manage acute post-operative pain. Further research is required to identify potential factors contributing to the current prescribing habits of OMFS and other clinicians. Such studies would facilitate a more targeted approach to professional education in prescribing analgesics.

Previous studies have mainly focused on general opioid prescribing habits from the perspective of OMFS; however, limited research exists from the perspective of the patients being prescribed the opioid medications. Furthermore, current literature has focused on the adult patient population, and only a few studies have focused on the youth population. Given how significantly youth are negatively affected by the opioid crisis, it seems reasonable to invite greater research efforts focusing on this population. By gaining a better understanding of beliefs common to youth patients, improved patient education tools can be developed to promote safe opioid use, storage, and disposal practices. A comprehensive screening tool that identifies risk factors for first-time opioid users may also be beneficial. This may include the implementation of new or revised screening tools that identify youth patients at risk of opioid misuse. Factors such as family history of substance abuse, lower school achievement, involvement in risk-seeking behaviour, and impacts of COVID-19 on mental health should be considered.

Ultimately, improved and active patient engagement among healthcare providers and their patients can help to address the ongoing opioid crisis. Further research aimed at both the level of healthcare providers and their patients on the general safety surrounding prescription opioids is needed.

Bibliography

- [1] World Health Organization: Management of Substance Abuse Team. Community Management of Opioid Overdose. 2014.
- [2] Ottawa: Public Health Agency of Canada. Apparent Opioid and Stimulant Toxicity Deaths 2023. <https://health-infobase.canada.ca/substance-related-harms/opioids-stimulants/> (accessed October 26, 2023).
- [3] Canadian Centre on Substance Use and Addiction. Canada's Opioid Crisis: What You Should Know. 2021.
- [4] Canadian Centre on Substance Use and Addiction. Canadian Drug Summary: Opioids. 2022.
- [5] Karamouzian M, Papamihali K, Graham B, Crabtree A, Mill C, Kuo M, et al. Known Fentanyl Use Among Clients of Harm Reduction Sites in British Columbia, Canada. *International Journal of Drug Policy* 2020;77. <https://doi.org/10.1016/j.drugpo.2020.102665>.
- [6] National Institute on Drug Abuse. Prescription Opioids Drug Facts. 2021.
- [7] Nafziger AN, Barkin RL. Opioid Therapy in Acute and Chronic Pain. *J Clin Pharmacol* 2018;58:1111–22. <https://doi.org/10.1002/jcph.1276>.
- [8] Schuckit MA. Treatment of Opioid-Use Disorders. *New England Journal of Medicine* 2016;375:357–68. <https://doi.org/10.1056/nejmra1604339>.
- [9] Health Canada. Canada's Opioid Crisis. 2019.
- [10] National Institute on Drug Abuse. Naloxone Drug Facts. 2021.
- [11] Brady KT, McCauley JL, Back SE. Prescription Opioid Misuse, Abuse, and Treatment in the United States: An Update. *American Journal of Psychiatry* 2016;173:18–26. <https://doi.org/10.1176/appi.ajp.2015.15020262>.
- [12] British Columbia Centre on Substance Use. Infosheet: What is the Difference Between Naloxone (Narcan) and Buprenorphine/Naloxone (Suboxone)? 2016.
- [13] Pearce LA, Min JE, Piske M, Zhou H, Homayra F, Slaunwhite A, et al. Opioid Agonist Treatment and Risk of Mortality During Opioid Overdose Public Health Emergency: Population Based Retrospective Cohort Study. *The BMJ* 2020;368. <https://doi.org/10.1136/bmj.m772>.
- [14] British Columbia Centre on Substance Use. A Guideline for the Clinical Management of Opioid Use Disorders. 2017.
- [15] British Columbia Centre on Substance Use. Frequently Asked Questions: Buprenorphine/Naloxone Treatment. 2017.
- [16] British Columbia Centre on Substance Use. Guideline Supplement: Treatment of Opioid Use Disorder for Youth. 2017.
- [17] Cragg A, Hau JP, Woo SA, Kitchen SA, Liu C, Doyle-Waters MM, et al. Risk Factors for Misuse of Prescribed Opioids: A Systematic Review and Meta-Analysis. *Ann Emerg Med* 2019;74:634–46. <https://doi.org/10.1016/j.annemergmed.2019.04.019>.
- [18] Koirala B. Rethinking Opioid Prescribing in Dentistry. *Journal of Oral Care and Dentistry* 2020;2.
- [19] Canadian Public Health Association. The Opioid Crisis in Canada. 2016.

- [20] Substance Abuse and Mental Health Services Administration. Talking With Your Teen About Opioids: Keeping Your Kids Safe. 2020.
- [21] Canadian Institute for Health Information. Opioid Prescribing in Canada: How Are Practices Changing? 2019.
- [22] Bardwell G, Small W, Lavalley J, McNeil R, Kerr T. “People need them or else they’re going to take fentanyl and die”: A Qualitative Study Examining the ‘Problem’ of Prescription Opioid Diversion During an Overdose Epidemic. *Soc Sci Med* 2021;279. <https://doi.org/10.1016/j.socscimed.2021.113986>.
- [23] Canadian Institute for Health Information. Opioid Prescribing in Canada: How Are Practices Changing? 2019.
- [24] Drug Free Kids Canada. Let’s Talk Opioids Including Fentanyl: A Parent’s Guide to Understanding Opioid Use by Youth. 2020.
- [25] Belzak L, Halverson J. The Opioid Crisis in Canada: A National Perspective. *Health Promotion and Chronic Disease Prevention in Canada* 2018;38:224–33. <https://doi.org/10.24095/hpcdp.38.6.02>.
- [26] O’Donnell J, Tanz LJ, Gladden; R Matt, Davis NL, Bitting J. Trends in and Characteristics of Drug Overdose Deaths Involving Illicitly Manufactured Fentanyls — United States, 2019–2020. 2021.
- [27] Leen JLS, Juurlink DN. Carfentanil: A Narrative Review of its Pharmacology and Public Health Concerns. *Canadian Journal of Anesthesia* 2019;66:414–21. <https://doi.org/10.1007/s12630-019-01294-y>.
- [28] Shafer SL. Carfentanil: A Weapon of Mass Destruction. *Canadian Journal of Anesthesia* 2019;66:351–5. <https://doi.org/10.1007/s12630-019-01295-x>.
- [29] Sabounchi SS, Sabounchi SS, Cosler LE, Serdar Atav A. Opioid Prescribing and Misuse Among Dental Patients in the US: A Literature-Based Review. *Quintessence Int (Berl)* 2020;51:64–76. <https://doi.org/10.3290/j.qi.a43697>.
- [30] Jayasinha R, Nairn S, Conrod P. A Dangerous “Cocktail”: The COVID-19 Pandemic and the Youth Opioid Crisis in North America: A Response to Vigo et al. (2020). *Canadian Journal of Psychiatry* 2020;65:692–4. <https://doi.org/10.1177/0706743720943820>.
- [31] Krebs E, Zhou C, Min JE, Carter C, McGowan G, Nosyk B. Diagnosis of Opioid Use Disorder by Youths Assessed in Acute Care Settings in British Columbia, Canada. *Journal of Pediatrics* 2021;232:243–50. <https://doi.org/10.1016/j.jpeds.2021.01.046>.
- [32] Rahmandar MH, Williams FS, Kuhns LM. Understanding Risk Factors for Persistent Opioid Use among Youths. *JAMA Netw Open* 2021;4. <https://doi.org/10.1001/jamanetworkopen.2021.4904>.
- [33] Levy S. Youth and the Opioid Epidemic. *Pediatrics* 2019;143. <https://doi.org/https://doi.org/10.1542/peds.2018-2752>.
- [34] Canadian Centre on Substance Use and Addiction. Prescription Opioids. 2020.
- [35] Finkelstein Y, MacDonald EM, Gonzalez A, Sivilotti MLA, Mamdani MM, Juurlink DN. Overdose Risk in Young Children of Women Prescribed Opioids. *Pediatrics* 2017;139. <https://doi.org/10.1542/peds.2016-2887>.
- [36] Hudgins JD, Porter JJ, Monuteaux MC, Bourgeois FT. Prescription Opioid Use and Misuse Among Adolescents and Young Adults in the United States: A National Survey Study. *PLoS Med* 2019;16. <https://doi.org/10.1371/journal.pmed.1002922>.

- [37] McCabe SE, West BT, Boyd CJ. Leftover Prescription Opioids and Nonmedical Use Among High School Seniors: A Multi-Cohort National Study. *Journal of Adolescent Health* 2013;52:480–5. <https://doi.org/10.1016/j.jadohealth.2012.08.007>.
- [38] Miech R, Johnston L, O'Malley PM, Keyes KM, Heard K. Prescription Opioids in Adolescence and Future Opioid Misuse. *Pediatrics* 2015;136:1169–77. <https://doi.org/10.1542/peds.2015-1364>.
- [39] Schroeder AR, Dehghan M, Newman TB, Bentley JP, Park KT. Association of Opioid Prescriptions from Dental Clinicians for US Adolescents and Young Adults with Subsequent Opioid Use and Abuse. *JAMA Intern Med* 2019;179:145–52. <https://doi.org/10.1001/jamainternmed.2018.5419>.
- [40] Haas DA. An Update on Analgesics for the Management of Acute Postoperative Dental Pain. *J Can Dent Assoc (Tor)* 2002;68:476–82.
- [41] Dionne RA, Berthold CW. Therapeutic Uses of Non-Steroidal Anti-Inflammatory Drugs in Dentistry. *Critical Reviews in Oral Biology & Medicine* 2001;12:315–30.
- [42] Royal College of Dental Surgeons of Ontario. Guidelines - The Role of Opioids in the Management of Acute and Chronic Pain in Dental Practice. 2015.
- [43] Chua KP, Hu HM, Waljee JF, Brummett CM, Nalliah RP. Opioid Prescribing Patterns by Dental Procedure Among US Publicly and Privately Insured Patients, 2013 Through 2018. *Journal of the American Dental Association* 2021;152:309–17. <https://doi.org/10.1016/j.adaj.2021.01.001>.
- [44] CDC Guideline for Prescribing Opioids for Chronic Pain-United States, 2016 Morbidity and Mortality Weekly Report. 2016.
- [45] American Association of Oral and Maxillofacial Surgeons. Opioid Prescribing: Acute and Postoperative Pain Management. 2017.
- [46] Thornhill MH, Suda KJ, Durkin MJ, Lockhart PB. Is It Time US Dentistry Ended Its Opioid Dependence? *Journal of the American Dental Association* 2019;150:883–9. <https://doi.org/10.1016/j.adaj.2019.07.003>.
- [47] American Association of Oral and Maxillofacial Surgeons. The Management of Impacted Third Molar Teeth. 2017.
- [48] American Association of Oral and Maxillofacial Surgeons. Third Molar Clinical Studies Summary of Data. 2017.
- [49] American Association of Oral and Maxillofacial Surgeons. White Paper: Management of Third Molar Teeth. 2016.
- [50] Rafetto LK. Managing Impacted Third Molars. *Oral Maxillofac Surg Clin North Am* 2015;27:363–71. <https://doi.org/10.1016/j.coms.2015.04.004>.
- [51] Resnick CM, Calabrese CE, Afshar S, Padwa BL. Do Oral and Maxillofacial Surgeons Over-Prescribe Opioids After Extraction of Asymptomatic Third Molars? *Journal of Oral and Maxillofacial Surgery* 2019;77:1332–6. <https://doi.org/10.1016/j.joms.2019.02.011>.
- [52] Okunev I, Frantsve-Hawley J, Tranby E. Trends in National Opioid Prescribing for Dental Procedures Among Patients Enrolled in Medicaid. *Journal of the American Dental Association* 2021;152:622–30. <https://doi.org/10.1016/j.adaj.2021.04.013>.
- [53] Weiland BM, Wach AG, Kanar BP, Castele MT, Sosovicka MF, Cooke MR, et al. Use of Opioid Pain Relievers Following Extraction of Third Molars. *Compendium* 2015;36.

- [54] Mutlu I, Abubaker AO, Laskin DM. Narcotic Prescribing Habits and Other Methods of Pain Control by Oral and Maxillofacial Surgeons After Impacted Third Molar Removal. *Journal of Oral and Maxillofacial Surgery* 2013;71:1500–3. <https://doi.org/10.1016/j.joms.2013.04.031>.
- [55] Pynn BR, Laskin DM. Comparison of Narcotic Prescribing Habits and Other Methods of Pain Control by Oral and Maxillofacial Surgeons in the United States and Canada. *Journal of Oral and Maxillofacial Surgery* 2014;72:2402–4. <https://doi.org/10.1016/j.joms.2014.06.436>.
- [56] Maughan BC, Hersh E V., Shofer FS, Wanner KJ, Archer E, Carrasco LR, et al. Unused Opioid Analgesics and Drug Disposal Following Outpatient Dental Surgery: A Randomized Controlled Trial. *Drug Alcohol Depend* 2016;168:328–34. <https://doi.org/10.1016/j.drugalcdep.2016.08.016>.
- [57] Han JT, Susarla SM, Dodson TB, Lang MS. Are Oral and Maxillofacial Surgeons Prescribing Fewer Opioids and More Non-Narcotic Analgesics for Postoperative Pain After Third Molar Removal? *Journal of Oral and Maxillofacial Surgery* 2020;78:358–65. <https://doi.org/10.1016/j.joms.2019.08.009>.
- [58] Magraw C, Pham M, Neal T, Kendell B, Reside G, Phillips C, et al. A Multimodal Analgesic Protocol May Reduce Opioid Use After Third Molar Surgery: A Pilot Study. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2018;126:214–7. <https://doi.org/10.1016/j.oooo.2018.04.007>.
- [59] Harbaugh CM, Lee JS, Hu HM, McCabe SE, Voepel-Lewis T, Englesbe MJ, et al. Persistent Opioid Use Among Pediatric Patients After Surgery. *Pediatrics* 2018;141.
- [60] Hadland SE, Bagley SM. Opioid Prescribing Patterns and Subsequent Overdose. *JAMA Pediatr* 2020;174:124–5. <https://doi.org/10.1001/jamapediatrics.2019.4885>.
- [61] Friedman RA. The Changing Face of Teenage Drug Abuse- The Trend Toward Prescription Drugs. *N Engl J Med* 2006;14:1448–50.
- [62] Harbaugh CM, Vu J v., DeJonckheere M, Kim N, Nichols LP, Chang T. Youth Perspectives of Prescription Pain Medication in the Opioid Crisis. *Journal of Pediatrics* 2020;221:159–64. <https://doi.org/10.1016/j.jpeds.2020.02.003>.
- [63] Lord S, Brevard J, Budman S. Connecting to Young Adults: An Online Social Network Survey of Beliefs and Attitudes Associated with Prescription Opioid Misuse Among College Students. *Subst Use Misuse* 2011;46:66–76. <https://doi.org/10.3109/10826084.2011.521371>.
- [64] Arria AM, Caldeira KM, Vincent KB, O’Grady KE, Wish ED. Perceived Harmfulness Predicts Nonmedical Use of Prescription Drugs Among College Students: Interactions With Sensation-Seeking. *Prevention Science* 2008;9:191–201. <https://doi.org/10.1007/s11121-008-0095-8>.
- [65] Fujii MH, Hodges AC, Russell RL, Roensch K, Beynnon B, Ahern TP, et al. Post-Discharge Opioid Prescribing and Use after Common Surgical Procedure. *J Am Coll Surg* 2018;226:1004–12. <https://doi.org/10.1016/j.jamcollsurg.2018.01.058>.
- [66] Gregorian R, Marrett E, Sivathanu V, Torgal M, Shah S, Kwong WJ, et al. Safe Opioid Storage and Disposal: A Survey of Patient Beliefs and Practices. *J Pain Res* 2020;13:987–95. <https://doi.org/10.2147/JPR.S242825>.
- [67] Varisco TJ, Fleming ML, Bapat SS, Wanat MA, Thornton D. Health Care Practitioner Counseling Encourages Disposal of Unused Opioid Medications.

- Journal of the American Pharmacists Association 2019;59:809–15.
<https://doi.org/10.1016/j.japh.2019.07.010>.
- [68] Romberg AR, Rath JM, Miller Lo EJ, Mayo A, Liu M, Vallone DM, et al. Young Adults' Opioid Prescription History and Opioid Misuse Perceptions. *Am J Health Behav* 2019;43:361–72. <https://doi.org/10.5993/AJHB.43.2.12>.
 - [69] McCabe SE, West BT, Boyd CJ. Motives for Medical Misuse of Prescription Opioids Among Adolescents. *Journal of Pain* 2013;14:1208–16. <https://doi.org/10.1016/j.jpain.2013.05.004>.
 - [70] Boyd CJ, McCabe ES, Cranford JA, Young A. Prescription Drug Abuse and Diversion Among Adolescents in a Southeast Michigan School District. *Arch Pediatr Adolesc Med* 2007;161:276–81.
 - [71] Lord S, Downs G, Furtaw P, Chaudhuri A, Silverstein A, Gammaitoni A, et al. Nonmedical Use of Prescription Opioids and Stimulants Among Student Pharmacists. *Journal of the American Pharmacists Association* 2009;49:519–28. <https://doi.org/10.1331/JAPhA.2009.08027>.
 - [72] McCabe SE, Cranford JA, Boyd CJ, Teter CJ. Motives, Diversion and Routes of Administration Associated with Nonmedical Use of Prescription Opioids. *Addictive Behaviors* 2007;562–75.
 - [73] Nalliah RP, Sloss KR, Kenney BC, Bettag SK, Thomas S, Dubois K, et al. Association of Opioid Use with Pain and Satisfaction after Dental Extraction. *JAMA Netw Open* 2020;3. <https://doi.org/10.1001/jamanetworkopen.2020.0901>.
 - [74] Hasak JM, Roth Bettlach CL, Santosa KB, Larson EL, Stroud J, Mackinnon SE. Empowering Post-Surgical Patients to Improve Opioid Disposal: A Before and After Quality Improvement Study. *J Am Coll Surg* 2018;226:235–40. <https://doi.org/10.1016/j.jamcollsurg.2017.11.023>.
 - [75] Rose P, Sakai J, Argue R, Froehlich K, Tang R. Opioid Information Pamphlet Increases Postoperative Opioid Disposal Rates: A Before Versus After Quality Improvement Study. *Canadian Journal of Anesthesia* 2016;63:31–7. <https://doi.org/10.1007/s12630-015-0502-0>.
 - [76] de la Cruz M, Reddy A, Balankari V, Epner M, Frisbee-Hume S, Wu J, et al. The Impact of an Educational Program on Patient Practices for Safe Use, Storage, and Disposal of Opioids at a Comprehensive Cancer Center. *Oncologist* 2017;22:115–21. <https://doi.org/10.1634/theoncologist.2016-0266>.
 - [77] Institute for Safe Medication Practices Canada. Managing Pain After Wisdom Teeth Removal: Your Questions Answered. 2019.
 - [78] Canadian Pharmacists Association. Opioid Stewardship 2023. <https://www.pharmacists.ca/advocacy/practice-development-resources/opioid-stewardship/> (accessed September 23, 2023).
 - [79] Cid A, Ng A, Ip V. Addressing the Opioid Crisis—The Need for a Pain Management Intervention in Community Pharmacies in Canada: A Narrative Review. *Pharmacy* 2023;11:71. <https://doi.org/10.3390/pharmacy11020071>.
 - [80] Rickles NM, Huang AL, Gunther MB, Chan WJ. An Opioid Dispensing and Misuse Prevention Algorithm for Community Pharmacy Practice. *Research in Social and Administrative Pharmacy* 2019;15:959–65. <https://doi.org/10.1016/j.sapharm.2018.02.004>.

- [81] Strand MA, Eukel H, Burck S. Moving Opioid Misuse Prevention Upstream: A Pilot Study of Community Pharmacists Screening for Opioid Misuse Risk. *Research in Social and Administrative Pharmacy* 2019;15:1032–6. <https://doi.org/10.1016/j.sapharm.2018.07.011>.
- [82] Owen JA. Pharmacists' Role in Addressing Opioid Abuse, Addiction, and Diversion. *Journal of the American Pharmacists Association* 2014;54. <https://doi.org/10.1331/JAPhA.2014.13101>.
- [83] Kleinman RA, Brothers TD, Danilewitz M, Bahji A. Office-based Methadone Prescribing for Opioid Use Disorder: The Canadian Model. *J Addict Med* 2022;16:499–504. <https://doi.org/10.1097/ADM.0000000000000950>.
- [84] Buffington DE, Lozicki A, Alfieri T, Bond TC. Understanding Factors That Contribute to the Disposal of Unused Opioid Medication. *J Pain Res* 2019;12:725–32. <https://doi.org/10.2147/JPR.S171742>.
- [85] McHugh RK, DeVito EE, Dodd D, Carroll KM, Potter JS, Greenfield SF, et al. Gender Differences in a Clinical Trial for Prescription Opioid Dependence. *J Subst Abuse Treat* 2013;45:38–43. <https://doi.org/10.1016/j.jsat.2012.12.007>.
- [86] Harbaugh CM, Nalliah RP, Hu HM, Englesbe MJ, Waljee JF, Brummett CM. Persistent Opioid Use After Wisdom Tooth Extraction. *Journal of the American Medical Association* 2018;320:504–6. <https://doi.org/10.1080/01621459.1927.10502953>.
- [87] Osborne V, Serdarevic M, Crooke H, Striley C, Cottler LB. Non-Medical Opioid Use in Youth: Gender Differences in Risk Factors and Prevalence. *Addictive Behaviors* 2017;72:114–9. <https://doi.org/10.1016/j.addbeh.2017.03.024>.
- [88] Silver ER, Hur C. Gender Differences in Prescription Opioid Use and Misuse: Implications for Men's Health and the Opioid Epidemic. *Prev Med (Baltim)* 2020;131. <https://doi.org/10.1016/j.ypmed.2019.105946>.

Appendices

Appendix A

Survey

Q1 What gender do you identify as?

- ☐ Man
- ☐ Woman
- ☐ Transgender woman | Trans woman
- ☐ Transgender man | Trans man
- ☐ Non-binary
- ☐ Two-spirit
- ☐ Not listed (please specify)
- ☐ Prefer not to answer

Q2 What is your current age (in years)?

Q3 What dental or oral surgical procedure did you undergo

- ☐ Wisdom tooth/teeth extraction
- ☐ Orthognathic surgery (jaw surgery)
- ☐ Other (please specify)

Reliability 1 Do you believe that all patients require medication to manage pain after oral surgical procedures?

- ☐ Yes
- ☐ No
- ☐ No opinion about this

Q4 After your procedure, were you given instructions on how to manage your pain?

- ☐ Yes
- ☐ No

Q5 Did the instructions include using over-the-counter medications:

	Yes	No	I don't know
Acetaminophen (Tylenol)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ibuprofen (Advil, Motrin)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Naproxen (Aleve)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6 Did you use any of these over-the-counter medications to help manage your pain?

- ☐ Yes
- ☐ No

Q7 Were you given a prescription for pain medication to take after your surgical procedure?

- ☐ Yes
- ☐ No

Q8 Which one? Check all that apply.

- ☐ Codeine (Tylenol #3)
- ☐ Oxycodone (Percocet, Oxycontin, Roxicodone)
- ☐ Hydromorphone (Dilaudid)
- ☐ Morphine (MS Contin)
- ☐ Other (please specify)

Q9 Did you get/buy this prescription?

- ☐ Yes
- ☐ No

Q10 How many pills were you prescribed?

Q11 How many pills were you taking a day?

- ☐ None
- ☐ One pill per day
- ☐ More than one pill per day

Q12 How many pills do you have left (not used)?

Q13 Did you take the prescription medication at the frequency and quantity as prescribed?

- ☐ Yes
- ☐ No

Q14 What information did you receive about prescription opioid medication use? Check all that apply.

- ☐ How to store it
- ☐ How to dispose of it
- ☐ No instructions were given
- ☐ I do not remember
- ☐ Other (please specify)

Q15 Who provided the information to you? Check all that apply.

- ☐ Healthcare professional (eg. nurse, doctor, surgeon, hospital/office staff member)
- ☐ Pharmacist
- ☐ Parent
- ☐ School and friends
- ☐ Other (please specify)

Q16 Where did you store the prescription medication?

- ☐ Open location (easily accessible to anyone living with me at home)
- ☐ Concealed location in my home
- ☐ Locked location in my home

Q17 Indicate the reason(s) why you did not store your prescription medication in a locked location (check all that apply):

- ☐ I am not worried about anyone taking my medication
- ☐ I have no access to a locked location
- ☐ I did not lock up my medication because this is inconvenient
- ☐ Other reason not to lock medication (please specify)

Q18 Do you believe there is any risk that the prescription medication kept in your home could be taken or used by someone else without permission?

- ☐ Yes
- ☐ No
- ☐ Not sure if there is risk or not of someone taking and using it

Q19 What did you do with any leftover pills from your prescription medication?

- ☐ I still have leftovers of the medication
- ☐ I disposed of the medication
- ☐ Other (please specify)

Q20 Please specify methods used by you to dispose of unused prescription medications:

- ☐ Threw the bottle with unused medications in household garbage
- ☐ Flushed leftover medications down the toilet
- ☐ Returned unused medications to a pharmacy
- ☐ Took medications to a hazardous waste facility
- ☐ I did not dispose of my unused opioid medications (still have it)

Q21 Please indicate the reason(s) why you did not dispose of your unused prescription medications (check all that apply):

- ☐ Save it for future need
- ☐ Not told that I need to dispose it
- ☐ Do not know how to dispose it
- ☐ Saving this medication for family/friend because they might need it
- ☐ Other (please specify)

Q22 Please rate each of the following statements below with one of the following:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Prescription opioid medications are safer than alcohol or other drugs because they are prescribed by health professionals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compared to alcohol or other drugs, I am less likely to get into trouble using prescription opioid medications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prescription opioid medications are less expensive than alcohol or other drugs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prescription opioid medications are easier to get than alcohol or other drugs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q23 How much do you think people risk harming themselves (physically or in other ways) if they take prescription opioid medications once or twice for non-medical reasons? (non-medical means use of a prescription drug without a prescription or for reasons other than those indicated by a doctor)

- ☐ No risk
- ☐ Slight risk
- ☐ Moderate risk
- ☐ Great risk
- ☐ Not sure if there is such risk or not

Q24 How much do you think people risk harming themselves (physically or in other ways) if they take prescription opioid medications occasionally (more than once or twice) for non-medical reasons?

- ☐ No risk
- ☐ Slight risk
- ☐ Moderate risk
- ☐ Great risk
- ☐ Not sure if there is such risk or not

Q25 How much do you think people risk harming themselves (physically or in other ways) if they take prescription opioid medications regularly (3-4 times a week) for non-medical reasons?

- ☐ No risk
- ☐ Slight risk
- ☐ Moderate risk
- ☐ Great risk
- ☐ Not sure if there is such risk or not

Q26 How common do you think it is for people like you to take prescription opioid medications in order to relieve pain without a doctor telling them to do so?

- ☐ Extremely rare
- ☐ Somewhat rare
- ☐ Neither common nor rare
- ☐ Somewhat common
- ☐ Extremely common
- ☐ I have no opinion about this
- ☐ I have no knowledge about this

Q27 How common do you think it is for people like you to take prescription opioid medications (no doctor's prescription) in order to relax/have fun/get high (not primarily to relieve pain)?

- ☐ Extremely rare
- ☐ Somewhat rare
- ☐ Neither common nor rare
- ☐ Somewhat common
- ☐ Extremely common
- ☐ I have no opinion about this
- ☐ I have no knowledge about this

Q28 How common do you think it is for people like you to become addicted to prescription opioids?

- ☐ Extremely rare
- ☐ Somewhat rare
- ☐ Neither common nor rare
- ☐ Somewhat common
- ☐ Extremely common
- ☐ I have no opinion about this
- ☐ I have no knowledge about this

Reliability 2 Do you believe that all patients require medication to manage pain after oral surgical procedures?

- ☐ Yes
- ☐ No
- ☐ No opinion about this

Q29 Which of the following pain medications have you EVER used for non-medical reasons? (non-medical means use of a prescription drug without a prescription or for reasons other than those indicated by a doctor) (check all that apply):

- ☐ Oxycodone (OxyContin) [Oxy, OC, Oxycotton]
- ☐ Oxycodone (Percocet, Percodan, Roxicet) [Percs]
- ☐ Hydrocodone (Vicodin, Lortab) [Hydro, Vikes]
- ☐ Acetaminophen with Codeine (Tylenol with Codeine) (T-3s, T-4s, T-5s]
- ☐ Meperidine (Demorol) [Demmies]
- ☐ Hydromorphone (Dilaudid) [Dillies]
- ☐ Norphindin [Norphie, Norph]
- ☐ Methadone [Dollioes, 'Done]
- ☐ Morphine (MS-Contin, Kadian, Avinza, MSIR) [M, Morph, Miss Emma]
- ☐ Fentanyl (Duragesic (Fentanyl patch)) [Pain patch, Morphine patch]
- ☐ Fentanyl lollipop (Actiq) [Perc-a-pop]
- ☐ Tramadol (Ultram)
- ☐ Other prescription pain medications not listed (please specify)
- ☐ None of the above

Q30 Please provide the reason(s) why you used pain medications not prescribed by a doctor (check all that apply):

- ☐ Because it relieves pain
- ☐ Because it gives me a high
- ☐ Because I like to experiment
- ☐ Because it helps me sleep
- ☐ Because it helps decrease my anxiety
- ☐ Because it's safer than street drugs
- ☐ Because it counteracts the effects of other drugs
- ☐ Because I'm addicted
- ☐ Other reason (please specify)

If “Because I’m addicted” is chosen above: Would you like to receive resources following completion of this survey?

- ☐ Yes
- ☐ No

For individual, family, and small group counselling and referrals to community substance use treatment services, please call **BC Alcohol and Drug Information & Referral Service at 1-800-663-144**, available toll-free 24 hours a day.

For non-emergency health information and advice, please call **HealthLink BC at 8-1-1**, available toll-free 24 hours a day.

For youth online chat services to receive support, information, and resources, please click here (<https://youthinbc.com>), available from 12pm to 1am.

To find in-person treatment options in your area, please click here (“Opioid Agonist Treatment Clinics Accepting New Patients” <https://www.bccsu.ca/wp-content/uploads/2022/03/OAT-Clinics-Accepting-New-Patients.pdf>).

Q31 For prescription medications that you have used that you DON'T have a prescription for, how did you get them? (Check all that apply)

- ☐ Friend
- ☐ Parent
- ☐ Other family member (please specify)
- ☐ Online
- ☐ Another person I know
- ☐ Worksite
- ☐ N/A; I have a prescription for each medication I use

Q32 Is there anything else that you would like us to know about your experience with prescription pain medication?

Appendix B

Letter of Initial Contact

Hello,

Re: UBC Research Study

Study title:

Prescription opioid medications: behaviour, knowledge, and beliefs of potential risks among youth undergoing oral surgery procedures

We are writing to inform you of a study being conducted to learn more about the knowledge, behaviors, and beliefs of prescription opioid medications among youth ages 15 to 24. Through this study, we are hoping to gain insight into the current outlook that youth have in regards to prescription opioid medications and allow us to develop policies and programs that are aimed at reducing adverse health outcomes as a result of opioid use and potential misuse.

The principal investigator of the research study, Dr. Leeann Donnelly, is an Associate Professor in the Department of Oral Biological and Medical Sciences at UBC's Faculty of Dentistry. The co-investigator, Dr. Sarah Lam, is a graduate orthodontics student at UBC's Faculty of Dentistry. The research conducted for this study will be reported in Dr. Sarah Lam's graduate thesis.

We are reaching out to ask for your willingness to help distribute an online survey to your patients ages 15 to 24 following completion of an oral surgical procedure. Should you agree to participate, we ask that someone at your office (such as a staff member or receptionist) inform potential participants of the study in-office. They must then be able to email a survey link to patients 7 days following completion of their oral surgical procedure, with a reminder email to complete the survey 7 days afterwards. A recruitment advertisement will also be provided that can be placed at the front desk for patients to read.

For more information about the study or to arrange for your participation, please contact Dr. Sarah Lam at [XXX](#) or Dr. Leeann Donnelly at [XXX](#).

Dr. Sarah Lam may contact you regarding your willingness to help with survey distribution in the following weeks. However, if you do not want any further contact regarding this study, please contact Dr. Sarah Lam at [XXX](#).

Thank you,

Dr. Sarah Lam, B.MSc., DDS

UBC Graduate Orthodontics

Nobel Biocare Oral Health Centre/Faculty of Dentistry

2151 Wesbrook Mall

Vancouver, BC V6T 1Z3

Mobile #: XXX

[XXX](#)

Recruitment Advertisement

**Are you between the ages of
15 to 24?**

**Did you just have an oral surgery
procedure done?**

If so, you are invited to participate in an online,
anonymous **5 minute survey**.

You will be entered into a weekly draw to win a **\$50 gift card** for
your participation.

Please ask the front reception how to receive the survey.

**Prescription opioid medications: knowledge, behaviors, and beliefs
of potential risks among youth undergoing oral surgery procedures**



The researchers contributing to this
study are:

Dr. Sarah Lam (Orthodontics Resident,
UBC Faculty of Dentistry)

Dr. Leeann Donnelly (Assistant Professor,
UBC Faculty of Dentistry)

For more information, please contact

XXX

Version 1: June 9, 2022

Appendix D

Receptionist/Staff Member Script

(Note: This script will be used by the receptionist in-office for all youth patients ages 15-24 following their oral surgery procedure).

There is a research study being conducted by Dr. Sarah Lam, a graduate orthodontics resident at UBC Faculty of Dentistry, under the supervision of principal investigator Dr. Leeann Donnelly, an associate professor at UBC Faculty of Dentistry, that is looking to learn more about the knowledge, behaviours, and beliefs of prescription opioid medications among youth ages 15 to 24. It is an online, anonymous, 5 minute survey that you can complete at home 7 days from today. You can then be entered into a weekly draw for a \$50 gift card for your participation.

If you are interested in participating, we can send the survey link to you via email 7 days from today, and at that time you can decide whether or not you would like to participate. Is it okay if we email you the link to complete this survey in 7 days?

Are we able to use the email address that we have on file to send out the link for this survey?

(Note: if it is not the patient's email, but rather that of a parent/guardian, then the receptionist will ask if the patient is able to utilize the link that will be sent to the email address on file).

Appendix E

Email Script

Hello,

As discussed in-office following your oral surgery procedure, the following anonymous, **5 minute survey** is looking to learn more about the knowledge, behaviours, and beliefs of prescription opioid medications among youth ages 15 to 24.

You may open the survey in your web browser by clicking the link below:

Insert survey link here

As a thank you gesture for participating, you can enter your email address at the end of the survey for a chance at a weekly \$50 gift card.

Contact info:

This study is being conducted by Dr. Sarah Lam, a graduate orthodontics resident at the University of British Columbia (UBC) Faculty of Dentistry ([XXX](#)), under the supervision of principle investigator Dr. Leeann Donnelly, an associate professor at the UBC Faculty of Dentistry ([XXX](#)).

This study's ethics ID number is H22-00832.

Thank you,

Appendix F

Post-Operative Handout

_____ is happy to be a part of this UBC research project – thank you for taking the time to complete this anonymous, **5 minute survey**. This study is looking to learn more about the knowledge, behaviours, and beliefs of prescription opioid medications among youth ages 15 to 24.

As a thank you gesture for participating, you can enter your email address at the end of the survey for a chance at a weekly \$50 gift card.

Please complete this survey once you are done taking any pain medications you might need following your procedure.

You may access the survey by using the QR code from your smart phone:



Or follow the link to the survey here:

insert survey link here

Contact info:



This study is being conducted by Dr. Sarah Lam, a graduate orthodontics resident at the University of British Columbia (UBC) Faculty of Dentistry (XXX), under the supervision of principal investigator Dr. Leeann Donnelly, an associate professor at the UBC Faculty of Dentistry (XXX).

This study's ethics ID number is H22-00832.

Thank you for your participation.

Appendix G

Consent Form

You are invited to participate in a research study to learn more about the knowledge, behaviors, and beliefs of prescription opioid medications among youth ages 15 to 24.

Prescription opioid medications are drugs that are usually used to relieve pain. This may include medications such as Codeine, Morphine and Fentanyl.

This study is being conducted by Dr. Sarah Lam, a graduate orthodontics resident at the University of British Columbia (UBC) Faculty of Dentistry (XXX), under the supervision of principal investigator Dr. Leeann Donnelly, an associate professor at the UBC Faculty of Dentistry (XXX). This study is being funded by the Faculty of Dentistry. The findings from this study will be reported in a graduate thesis and may also be published in academic journal articles.

The survey will take approximately 5 minutes to complete. Your answers to the survey questions are anonymous and will be kept private- your email or IP address will not be linked to your answers. No personal identifying information will be collected in this survey. As such, we ask that you give us your honest opinions. Although there is no personal identifying information being collected, the topic of interest carries minimal risk, which depends on each participant and their experience with opioid use.

Although there will be no direct benefits for you, in the future, others may benefit from what we learn in this study. The findings will help us gain a better understanding into how youth such as yourselves view prescription opioid medications.

We are offering a chance to a weekly \$50 gift card upon completing the survey as a thank you gesture. In order to be considered for the draw, you will be asked to enter your email address at the end of the survey, which will not be shared with anyone other than the researchers of this study. All participants, even those who withdraw from the survey, will be allowed to enter this draw. Please note that this information will also not be used when reporting the findings and will be kept confidential for tracking purposes only.

Data will be securely stored on encrypted computers and shared between the researchers using a FIPPA and PIPEDA compliant (federal government mandated) tool. The researchers will only have access to the anonymized data. The information collected from the surveys will be stored for 5 years at UBC on a secure and encrypted data storage system.

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time. By completing this survey, you consent to participate in this study and having your answers included in the analyses. Please note that once your survey answers have been submitted, they cannot be withdrawn.

This study's ethics ID number is H22-00832.