

IDENTIFICATION OF BARRIERS AND FACILITATORS TO THE
IMPLEMENTATION OF AN OPIOID-ALTERNATIVE PROTOCOL TO TREAT
PATIENTS WITH MIGRAINE IN THE EMERGENCY DEPARTMENT

by

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DEDICATION

This paper and DNP project is dedicated to my cousin, Tracy Schafer, who passed away suddenly on April 17, 2017, due to an unintentional prescription opioid overdose. If one family can be spared the loss of a loved one from something so preventable, through simple education and changes in provider opioid-prescribing practices, it is my mission to ensure that happens.

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ABSTRACT

The Centers for Disease Control and Prevention list prescription medication (opioid) overdoses as the leading cause of death because of injury in the United States. This overwhelming statistic has led to what is now being considered an opioid epidemic and a national crisis. Provider opioid-prescribing practices have been recognized as one of the key components contributing to our nation's opioid epidemic. Hospital emergency departments (EDs) have been identified as one possible area for focused intervention. Even though ED providers write a small percentage of the total opioid prescriptions, many opioid-addicted patients have linked their first exposure to opioids with visits to the ED.

To prevent a future generation of opioid-addicted individuals, literature reviews have shown education as well as the consistent use of pain management guidelines and protocols could help improve provider opioid-prescribing practices. Protocols for non-opioid pain management have the potential for great impact on the care patients receive in the ED as well as reducing opioid use and misuse in our country. For purposes of this quality improvement project, an opioid-alternative protocol for managing migraine was evaluated for use in a Pacific Northwest Hospital (PNWH) ED.

This project utilized a constant comparison technique to evaluate the effectiveness of an educational intervention by evaluating results of surveys provided before and after the educational intervention. The intervention was based on a thorough review of the literature and current evidence-based migraine and opioid prescribing guidelines. The intended outcome of this project was threefold. The student investigator wanted to determine whether education could improve opioid knowledge among providers (MDs, NPs, PAs) and nursing staff at a PNWH ED; reduce perceived barriers toward implementation of opioid alternative protocols in the ED; and facilitate the implementation of an opioid-alternative protocol for migraine in the emergency department, thus improving provider opioid-prescribing practices.

Survey comparisons showed how nursing and provider knowledge regarding the opioid epidemic and commonly used opioid-alternatives for managing migraine pain was improved, many perceived barriers toward the implementation of opioid-alternative protocols in the ED were reduced, and support for the implementation of an opioid-alternative protocol to treat patients with migraine in the ED was achieved as a result of this project.

Keywords: opioid epidemic, opioid-alternative protocol, migraine, provider education, emergency department, chronic pain, pain management guidelines, protocol implementation, prescribing practices

CHAPTER ONE

INTRODUCTION

“Unintentional opioid overdoses have surpassed motor vehicle crashes as the leading cause of injury death in the U.S.” (Hoppe et al., 2015, p. 493). As part of the government’s urgent response to the epidemic of overdose deaths, the Centers for Disease Control and Prevention (CDC, 2016a) released the first-ever, national opioid-prescribing guidelines on March 15, 2016. Former president Barrack Obama identified fighting the opioid epidemic as a priority for his administration at the National Prescription Drug Abuse and Heroin Summit held in Atlanta, Georgia on March 29, 2016. President Trump continued his agenda by creating the federal commission to combat drug addiction and the opioid crisis in March, 2017, headed by New Jersey Governor Chris Christie.

Despite recent efforts to halt the opioid crisis, the death rate for Americans dying from opioid overdose continues to increase (Donnelly, 2016). Governor Christie stated in a CNN interview that “we have a 9/11-scale loss every three weeks” (2017). In August, 2017, Governor Christie and the opioid commission recommended the opioid crisis be declared a national emergency, which would allow for congressional action and funding to help fight the epidemic. Governor Christie also called for improved education in medical schools, as well as mandated continuing education, before providers could renew their DEA licensure (CCNN, 2017). Important first steps were made in fighting this

epidemic when President Trump proclaimed the opioid epidemic a public health emergency on October 26, 2017.

Background and Significance of the Opioid Epidemic

While the opioid epidemic spotlight became brighter after Prince's Fentanyl overdose on April 21, 2016, it has been a growing problem since 1999. Deaths from opioid overdose increased consecutively from 1999 to 2010 (Poon & Greenwood-Ericksen, 2014). The opioid epidemic has affected every race, socioeconomic background, and age group. It has impacted individuals, families, and communities, and has become an epidemic public health problem which is particularly evident in our emergency departments. Emergency department (ED) visits for nonmedical use of prescription opioids more than doubled from 2004 to 2011 (Nelson, Juurlink, & Perrone, 2015). Deaths due to opioids have quadrupled since 1999, with over 33,000 deaths attributed to opioids in 2015 (O'Donnell, Gladden, & Seth, 2017).

While the United States (U.S.) comprises only 5% of the world's population, it consumes over 99% of the world's hydrocodone supply (CDC, 2016c). In 2015, there were enough opioids prescribed for every American to be medicated around the clock for three weeks (CDC, 2017). The CDC (as cited by CBS News Special report on November 17, 2016) showed, "On an average day in the U.S. there are over 650,000 opioid prescriptions dispensed, 580 people start using heroin, and 91 people die from opioid-related overdose" (2016c). At least half of all opioid-overdose deaths have involved a prescription opioid, and an estimated 4/5 heroin users had been hooked on prescription

painkillers first (CDC, 2016c). The Surgeon General called substance abuse one of America's most pressing public health problems, with over 12.5 million Americans having abused prescription painkillers in 2015 alone (CBS News Special Report, 2016). The number of deaths attributable to opioids continues to rise with preliminary estimates of drug overdose deaths from 2016 showing over 64,000 people died from drug overdose, which would equate to a new estimate of 175 deaths/day (Katz, 2017).

Washington was one of the first states to recognize and respond to the opioid epidemic in 2008, as data at that time showed Washington State had an opioid-related mortality rate 50% higher (7.4 per 100,000) than the national average (4.8 per 100,000) (Garg et al., 2013). As a result, a consortium of all Washington agencies collaborated with the Washington Clinical Advisory Group to develop an opioid-prescribing guideline for Washington State (Franklin et al., 2015). In June, 2011, the Washington chapter of the American College of Emergency Physicians (ACEP) took that one step further when they adopted and disseminated the Washington Emergency Department Opioid Prescribing Guidelines, which further addressed acute pain prescribing as well as chronic, non-cancer pain (CNCP) prescribing specifically for the ED (Neven, Sabel, Howell, & Carlisle, 2012). The introduction of these guidelines initially resulted in a 29% decrease in the rate of prescription opioid-related deaths in Washington between 2008 and 2013 (Agency Medical Directors Group [AMDG], 2015). However, recent data from the CDC showed a 10.5% rise in opioid-related deaths from 2014-2015 in Washington State (2016d).

The above data show how a guideline's effectiveness at reducing opioid prescriptions and patient dependence on opioids is potentially limited by the fact that they

are simply guidelines, not policy, and as time passes, provider adherence to guidelines diminishes. “Evidence from other areas of medicine suggests that the passive dissemination of guidelines have only a modest effect on practice” (Juurlink, Dhalla, & Nelson, 2013, p. 880). If guidelines are not implemented institutionally as protocols, or followed consistently by all providers working in the ED, their effectiveness will be minimal. “To ensure adequate treatment outcomes, and to reduce the risks linked with the chronic use of opioids, practitioner’s adherence to treatment guidelines is essential” (Tournebize, Gibaja, Muszczak, & Kahn, 2016, p. 370).

Implementation of a protocol for treating patients with migraine was chosen as a possible intervention for reducing opioid use and misuse in a Pacific Northwest Hospital (PNWH) ED. A taskforce of neurologists from the American Academy of Neurology (AAN) determined that the reduction of opioid use in migraine care was a significant enough need to include it as the primary goal in their *Choosing Wisely* campaign (Young, Silverman, Bradford & Finkelstein, 2017). “Abortive opioid use is one of the top 5 correctable actions to be addressed” (Young et al., 2017, p. 1). Facilitating the implementation of an opioid-alternative protocol for treating patients with migraine-related pain would follow the AAN 2012 migraine treatment guidelines, as well as strategies addressed on January 5, 2017, in an executive summary from the Centers for Medicare & Medicaid Services (CMS) which recommended facilities and providers:

Implement more effective person-centered and population-based strategies to reduce the risk of opioid use disorders, overdoses, inappropriate prescribing, and drug diversion; and to increase the use of evidence-based practices for acute and chronic pain management. (p.2)

Educating providers and nursing staff about the importance of implementing an opioid-alternative was deemed necessary prior to protocol implementation as suggested by Peters, Tran, and Adam (2013). Peters et al. (2013) suggested involving individual stakeholders such as providers and frontline workers (nurses) in continuing education, peer learning, and protocol development as an important strategy toward protocol implementation. “Successful implementation research begins and ends with successful collaboration” (Peters et al., 2013, p. 42).

Clinical Question

Therefore, in an effort to lay the groundwork for potential implementation of a protocol that would be followed consistently by all ED personnel regarding the prescription of opioids for headache, an educational intervention for ED providers and nurses was developed that could have the potential to answer three clinical questions. Does such an educational intervention designed to improve provider opioid-prescribing practices:

- 1) Increase opioid knowledge among providers (MDs, NPs, PAs) and nursing staff
- 2) Reduce perceived barriers toward implementation of opioid-alternative protocols in the ED
- 3) Help facilitate the implementation of an opioid-alternative protocol for migraine in the emergency department?

CHAPTER TWO

REVIEW OF THE LITERATURE

An initial review of the literature was conducted to help the student investigator better understand what factors have contributed to our nation's current opioid epidemic and what interventions are needed in our society to improve provider opioid-prescribing practices. After an initial review of the literature, a more thorough review was conducted to find evidence to support whether or not education could improve knowledge, reduce perceived barriers to implementing opioid-alternative protocols and guidelines, and facilitate the implementation of an opioid-alternative protocol for treating migraine in a PNWH ED. High-level, quantitative evidence, as determined by Polit and Beck's Evidence Hierarchy (2012, p.28), was difficult to come by, especially when seeking methods to provide opioid education or how to reduce barriers and facilitate protocol implementation. High-level evidence was even more difficult to find when the topic was further narrowed to an environment such as the ED.

Quantitative data was compelling in regards to epidemiological data on the opioid epidemic, current opioid-prescribing guidelines, as well as the current state of opioid utilization in the ED. However, qualitative studies were useful in order to paint a broader picture of provider behaviors and beliefs for this project.

Literature Search Strategy

A systematic literature review was started in October, 2015, and concluded in October, 2017. Common databases searched include the following: CINAHL, Cochrane Library, Google and Google Scholar, Web of Science, Pub-med, UpToDate, PsycInfo, and Joanna Briggs. All articles published after 2005 were searched, with precedence given to those articles published after 2010, as many articles prior to 2010 didn't reflect current practice guidelines regarding opioids and migraine management. The following keywords were utilized: "provider education," "opioid prescribing habits," "opioids and pain management," "opioid epidemic," "opioids and emergency department guidelines," "opioid guidelines," "opioid-alternative protocols," "protocol implementation strategies," "migraine treatment," and "alternative protocols for migraine." A total of 86 articles were found pertinent to this project, of which 24 were chosen and will be included in the following review of the literature, which has been separated into the following sections to support the clinical questions for this project:

- 1) Current provider prescribing practices in the ED
- 2) Evidence for education as a means to improve provider prescribing practices
- 3) Evidence against opioids for treating migraine in the ED
- 4) Evidence for utilization of opioid-alternative protocols for treating migraine in the ED

Current Provider Prescribing Practices in the ED

Provider opioid-prescribing practices have been recognized as one of the key components contributing to the opioid epidemic throughout the literature. This conclusion has been identified based on provider lack of knowledge, the perceived safety of opioids, and an inaccurate belief in the under-treatment of pain (American Society of Interventional Pain Physicians [ASIPP], 2012). This section of the literature review will summarize the state of current ED prescribing practices and why there is a need for change.

Hoppe, Kim, and Heard (2015), in a retrospective cohort study of one urban academic ED in 2012, showed ED prescribing may be a “gateway to recurrent opioid abuse” (p. 497) and an important area to focus on for interventions to reduce opioid use and misuse. Their study showed 52% of all patients treated for an acute painful condition over a five-month time period were opioid-naïve (no opioid prescriptions in the preceding six months), and of those patients, 48% received an opioid prescription (Hoppe et al., 2015). Additionally, 17% of those patients who filled that first opioid prescription were still using opioids one year after the initial visit (Hoppe et al., 2015). When postulating why ED providers may over treat pain, Hoppe et al. (2015) cited Zgierska and Miller (2012), and determined one primary reason was because “pain and suffering are viewed as a threat to therapeutic success” (p.498).

A similar retrospective cohort study was conducted at a Level I trauma center ED in 2014 by Mattson, Scherber, Dierkhising, and Rudis (2016). Their findings, after reviewing charts of patients with a discharge diagnosis of acute pain, showed an opioid

was prescribed for 874 (30.5%) opioid-naïve patients (Mattson et al., 2016). The data from Mattson et al. (2016) showed 22.5% of the opioid-naïve patients had become episodic users after one year and 1.6% became long-term users. Risk factors that increased the potential for continued opioid use included patients with a history of anxiety and post-traumatic stress disorder (PTSD) and elderly and female patients (Mattson et al., 2016). Their findings showed an increase in the percentage of opioid dependence in opioid-naïve patients after one year as compared to the previous study by Hoppe et al. (2015).

A qualitative, original article by Neven et al. (2012) discussed the reasoning and process behind the need for the development of the Washington State ED opioid-prescribing guidelines in 2008. Due to high opioid-prescribing rates and increased opioid death rates in 2008, the staff at the Washington State Department of Health (WSDOH) started an interagency workgroup to coordinate prevention activities, and “to identify and promote possible methods to reduce ED visits for chronic pain and requests for opioid medication refill” (Neven et al., 2012, p. 354). One primary barrier found during the development process of the ED-specific opioid prescribing guidelines was the concern for patient satisfaction, and that limiting opioids from the ED would negatively impact patient satisfaction scores (Neven et al., 2012). While ED opioid-prescribing guidelines were implemented in various facilities as a result of this workgroup, controversy continues regarding their use and effectiveness (based on personal observations and statements from ED staff and providers at the PNWH intervention site).

Skaer and Nwude (2016) wrote a qualitative review article which also discussed the opioid prescribing laws and ED guidelines for chronic, non-cancer pain in Washington State. The authors discussed how ED prescribing and unnecessary use have been areas of concern in Washington State, thus the implementation of the aforementioned workgroup as well as the development of the Seven Best Practices Program and the *ER is for Emergencies* campaign in Washington State. Although Skaer and Nwude (2016) mentioned how these practices are supported by state legislation and have made a positive impact in reducing frequent user visits to the ED, they stressed how imperative it is that providers understand the new guidelines and make necessary adjustments in their opioid prescribing habits.

Garg et al. (2013) conducted an interrupted time-series analysis of Worker's Comp patients in Washington state before and after the implementation of the *Interagency Guideline on Opioid Dosing for Chronic Non-Cancer Pain* in 2007. Their study showed both chronic and high-dose opioid use rates declined (25.6% from 2004 - 2010) after the Washington guideline implementation (Garg et al., 2013). Although they could not attribute the extent of the reduction in use rates specifically to the Guideline, Garg et al. (2013) believed their findings contributed to the evidence base showing how risk management strategies such as guideline and protocol implementation may help to halt the progression of the opioid epidemic.

Barnett, Olenski, and Jena (2017) found emergency physicians' decisions to prescribe opioids was highly variable even when faced with identical case scenarios and practicing in the same ED. Barnett et al. (2017) further concluded there was a higher

incidence of long-term opioid abuse in patients who had not previously received opioids, but received treatment from high-intensity opioid prescribers (adjusted odds ratio, 1.3; 95% confidence interval, 1.23 to 1.37; $P < 0.001$). Rates of opioid prescribing between low-intensity and high-intensity providers within individual hospitals varied from 7.3% to 24.1% (Barnett et al., 2017). These results suggested just one encounter in the ED could increase the likelihood of future long-term opioid use for a patient, further supporting the proposed educational intervention and opioid-alternative protocol for migraine in the ED.

Improving Provider Prescribing Habits through Education

A consensus study report from the National Academies of Sciences, Engineering, and Medicine addressed strategies for influencing prescribing practices (Bonnie, Ford, & Phillips [Eds], 2017). The committee recommended state medical and other health-professional schools coordinate with their state licensing boards, the National Institutes of Health's Pain Consortium, the U.S. Food and Drug Administration, the CDC, and the Drug Enforcement Agency (DEA) to develop an evidence-based, national approach to pain education, which would encompass pharmacologic and non-pharmacologic treatments and educational materials for opioid prescribing (Bonnie et al., 2017). The consensus report followed earlier recommendations from the National Safety Council (NSC), which issued a statement on October, 20, 2015, to the Drug Enforcement Agency (DEA) proposing required education for all prescribers regarding opioid painkillers. The NSC proposed that mandatory education and training curricula should be a part of the

initial and subsequent registration of providers under the Controlled Substances Act of 1970 (NSC, 2015). Other supporting data for education was found in the CDC's updated 2016 guidelines for opioid use and included a subset of guideline handouts and suggestions for assessing benefits and harms of opioid therapy and listed non-opioid treatment options for chronic pain (CDC, 2016a).

Poon and Greenwood-Erickson, in their 2014 review of the literature, found that wide variations in emergency provider opioid prescribing practices existed. They were also only able to find one pain-management curriculum for emergency medicine residents, which was never implemented. As a result of their review of the literature, which showed such educational programs could improve opioid knowledge and improve a resident's knowledge, comfort, and confidence in the ability to manage chronic pain, Poon and Greenwood-Erickson (2014) designed a five-hour didactic for opioid prescribing that they felt could easily be integrated into a residency curriculum. No available literature supporting their theory or use of their curriculum was found.

Kamarudin, Penm, Chaar, and Moles (2013) conducted a systematic review to identify educational interventions which improved prescribing competencies of medical prescribers, and found that the World Health Organization (WHO) *Guide to Good Prescribing* had the largest body of evidence supporting its use to improve provider prescribing habits. In their review of the literature, Kamarudin et al. (2013) found that specific education on prescribing lead to improved prescribing competency as reported in studies that used tutorials and educational programs to guide the participants in the process of rational prescribing. Pertinent to the development of the educational

intervention created for this project, incorporating a prescribing component (protocol) into a “structured, problem-based curriculum also improved student’s ability to prescribe correctly” (Kamarudin et al., 2013, p. 15). Many studies Kamarudin et al. (2013) reviewed also found that the promotion of rational medication use, based on published practice guidelines in face-to-face interactions, positively affected health-professional behavior. This study supported the importance of changing provider prescribing habits and how various methods of education could positively affect provider adherence to guidelines. However, Kamarudin et al. (2013) were unable to find many high-quality studies that evaluated long-term changes in prescribing habits, and discussed the importance of further studies to better assess the effectiveness of educational interventions on prescribing.

Ganem, Mora, Varney, and Bebart (2015) performed a retrospective, three-year analysis of the prescribing practices of ED providers at two military bases. They found that civilian providers and physician assistants (PAs) were more apt to prescribe opioid medications than active duty providers (Ganem et al., 2015). Ganem et al. (2015) hypothesized this was possibly due to the fact that the military providers were noted to have much more opioid-related education. Military providers often participated in additional educational efforts, such as annual healthcare education regarding chronic pain, in direct efforts within the military to limit opioid prescriptions across the board (Ganem et al., 2015).

Donaldson, Harding, Taylor, Valley, and Greene (2017) evaluated the impact of a brief, one-on-one educational intervention on ED discharge opioid analgesic prescribing

in a major metropolitan ED in Australia. All 30 of the prescribers who received the educational intervention agreed or strongly agreed that their opioid-prescribing practices would change as a result of the educational session (Donaldson et al., 2017). Patient outcomes were also assessed in this study, and it was shown that significantly more patients (85%) reported using pain therapies other than oxycodone in the post-intervention group than in the pre-intervention group (49%) ($P < 0.01$), and the percentage of patients using simple analgesia increased from 28% to 70% ($P < 0.01$) after the intervention (Donaldson et al., 2017). Many barriers in the ED environment were identified in their study, which Donaldson et al. (2017) felt could serve as a gateway for recurrent opioid use and included: high patient turnover, time pressures, large numbers of rotating staff, different types of pain presentations and incongruities, provider's limited knowledge of a patient's medical history, and limited tools to identify patients at higher risk of opioid-related harm. Because of the potential for recurrent opioid use, Donaldson et al. (2017) determined EDs should be considered an important site for future interventions designed to improve opioid prescribing.

The next step in the review of the literature was to find evidence against using opioids for treating migraine in the ED. The following sections will review the literature against opioids for migraine in the ED, as well as review literature providing opioid-alternative options for treating migraine in the ED.

Evidence Against Opioids for Migraine in the ED

Headache was one of the most common reasons for ED visits in the U.S., and migraine accounted for about one-third of all ED visits in a retrospective probability study of randomly selected EDs across the U.S. (Friedman et al., 2015). Outpatient or ED administration of opioids has been associated with the “chronification” of migraine, defined as the multifactorial process by which a patient who suffers from intermittent, episodic migraines begins to experience migraine more frequently (Friedman et al., 2015). Opioids are not recommended for migraines for that reason, as well as the association between repeated ED visits and the administration of opioids, and the potential to cause refractoriness to triptan medications (Friedman et al., 2015). Though frequently prescribed for headache, opioids have been noted to offer less short-term relief and are less likely to produce sustained relief (Friedman et al., 2015). In their review of data, Friedman et al. (2015) also found that, despite practice guidelines recommending non-opioid treatment as first-line therapy for migraines, overuse of opioid medications continued as a method for treating acute migraine headaches in hospital EDs across the U.S. From their analysis of the National Hospital Ambulatory Medical Care Survey data from 2010, Friedman et al. (2015) discovered opioids were administered in 59% of the 1.2 million migraine visits to EDs in their study.

Young et al. (in press) conducted a cross-sectional analysis of consecutive adult ED patients in three diverse EDs in Connecticut who received treatment for migraine headache. They found that, despite current migraine-treatment recommendations against

using opioids for treatment of migraine, over one-third of the patients in their study sample received opioids (Young et al, in press).

Overall, opioids were given in 68.6% of visits in the community ED, 40.9% in the urban ED, and 12.3% in the academic center. Opioids were used as a first-line agent in 29.5% of visits on average and as a rescue agent in 49.4% of visits where additional medications were required. Opioids were given 58.2% of the time as first-line agents in the community ED, compared to 35.3% in the urban ED and 6.9% in the academic center. As a rescue medication, opioids were given 69.9% of the time at the community ED, 63.9% at the urban ED, and 20.6% at the academic center (Young et al., in press, para 15).

Young et al. (in press) also noted that patients who received opioids had a 37.7% increase in visits over the 14-month study period compared to those who were not given opioids. Of those who received opioids, 36% required further treatment in the form of rescue medications compared to 25.1% in the standard therapy group. Patients not given opioids as part of the treatment regimen had a 30.3% reduction in their length of stay (Young et al., in press). Results from this study also showed how educating providers and establishing “facility-based opioid-free treatment guidelines may lead to more appropriate migraine management strategies and better outcomes” (Young et al., in press, last paragraph).

Bajwa and Smith (2017) reviewed randomized control trials (RCTs) pertinent to the acute treatment of migraine. Like Young et al. (in press) and Friedman et al. (2015), Bajwa and Smith found that patients treated with opioids as first-line therapy were significantly more likely to return to the emergency department with a headache within seven days of the original visit (2017). Similar to those other studies, Bajwa and Smith also found that overuse of opioid medications for acute headache treatment in the ED was

widespread across the U.S. despite numerous practice guidelines that recommend providers avoid treating migraine with opioids, except as a last resort. They recommended treating acute headaches with migraine-specific agents such as dihydroergotamine (DHE) and triptans as first-line agents and, when possible, using a combination of a nonsteroidal anti-inflammatory drug (NSAID) with a triptan, which has been shown to be even more effective than either agent alone (Bajwa and Smith, 2017).

Gelfand and Goadsby's (2012) review of available evidence pertinent to the treatment of acute migraine in adults in the ED showed migraine can become more difficult to treat the longer it lasts, and migraine attacks generally become more severe with time. They stressed that opioids should generally be avoided and should never be considered first-line agents when treating migraine. Gelfand and Goadsby showed opioids can render triptans less effective, have the potential to increase return visits to the ED, and can promote chronic migraine and medication-overuse migraines (2012). Ultimately, they purported a multi-modal approach is typically the best method to treat migraine.

High-level, evidence-based guidelines and policies recommended by the CDC, the Agency for Healthcare Research and Quality (AHRQ), the Joint Commission, the American Society of Anesthesiologists (ASA), American Geriatrics Society, American Society of Pain Management Nursing, American Society of Perianesthesia Nurses, and the Society for Critical Care Medicine were reviewed as well. Without exception, all recommended a non-opioid foundation to migraine pain management.

In an NSC report on medication efficacies at treating pain, Teater (2015) discussed how opioid medications act as mild to moderate painkillers, and have been shown to be less effective at treating pain than if a person took acetaminophen and ibuprofen together (Table 1). One of the statistical measures used to show the effectiveness of pain medications is the number needed to treat (NNT). NNT, as Teater defined, is the dose of pain medication with the effect being 50% pain relief (2016). The lower the NNT, the more effective the medicine (Teater, 2015). For oral medications, an NNT of 1.5 is very good and an NNT of 2.5 is considered good (Teater, 2015). Oxycodone 15mg has an NNT of 4.6 while ibuprofen 200 mg + acetaminophen 500 mg has an NNT of 1.6, showing that one would have to treat 46 people for 10 of them to get 50% pain relief when taking oxycodone alone (Teater, 2015).

Table 1. Commonly Used Pain Medications and Their NNT, Teater (2015).

Medications	NNT
Diclofenac 100 mg	1.8
Celecoxib 400 mg	2.1
Ibuprofen 400 mg	2.5
Ibuprofen 1200 mg	1.8
Naproxen 750 mg	2.0
Ibuprofen 200 mg + Acetaminophen 500 mg	1.6
Oxycodone 10 mg + Acetaminophen 1000 mg	2.7
Oxycodone 5 mg + Acetaminophen 325 mg	5.5
Morphine 10 mg or Dilaudid 1 mg Intramuscular	2.5 to 2.9

The following sections will further review some identified, evidence-based recommendations and treatments for migraine in the ED.

CERTA

One recommended multimodal approach (La Pietra et al., 2016; Cohen et al., 2016; and Ackerman, 2016) to treating migraine pain is the Channels/Enzymes/Receptors Targeted Analgesia (CERTA). Unlike the more traditional, symptom-based approach, CERTA is a mechanism-based approach, which allows for broader utilization of non-opioid combinations and a more judicious usage of opioids (LaPietra et al., 2016). CERTA focuses on patient-specific, pain-syndrome-targeted analgesia and allows the different classes of analgesics to act on different target sites, which can result in greater pain relief and reduced dosages of each medication for the patient (LaPietra et al., 2016). LaPietra et al. (2016) have shown that using this method of pain control can lessen opioid side effects and shorten length of stay in the ED.

One excellent example of an ED's efforts to test a multimodal approach to pain therapy as an alternative to the routine use of opioids first occurred in 2014, at Maimonides Medical Center ED in Brooklyn, New York. Staff conducted an "opioid-free shift" where all adults arriving to the ED with pain complaints during the specified eight-hour period of time were treated according to an opioid-sparing protocol based on the above CERTA principles (Cohen et al., 2016). The rationale for the study was to evaluate how feasible it was to control acute painful conditions without using opioid analgesics. Prior to the shift, a physician educated all medical and nursing staff on CERTA strategies and common, adverse effects associated with the alternative therapies. Pain scores were

evaluated at 30 and 60 minutes after the medication was administered. At time of medication administration, the median pain score for the 17 patients studied was 8; at 30 minutes, the median pain score was 6; and at 60 minutes, the median score was 5 (Cohen et al., 2016). The study found that more than 80% of patients were satisfied with the pain relief provided through the CERTA-based protocol and no adverse drug reactions were reported (Cohen et al., 2016).

Another facility, St. Joseph's Regional Medical Center in New Jersey, launched a formal program in January, 2016, called the Alternatives to Opiates (ALTO) program based on utilizing those same CERTA strategies. The program has become so successful in the ED that other departments such as St. Joseph's Departments of Family Medicine, Chronic Pain Management, PM&R, and Psychiatry have all adopted its underlying principles for patient care (LaPietra, 2016). Actual research was unavailable at the time of this review; however, data is currently being validated, and the results of the study are optimistic based on personal email correspondence from Dr. LaPietra. There are many qualitative publications published since the protocol was first implemented in January 2016, such as the *American College of Emergency Physicians (ACEP)*, the *EM Resident, ED Management*, as well as *The New York Times*, which all give background information regarding the need for the program and its initial success. Dr. LaPietra (2016) believes the ALTO program has already changed the practice of pain management as seen by improved education, the implementation of novel concepts, and partnerships within the community. Thus, her goal is to make the program a national model (LaPietra, 2016).

Opioid-Alternative Protocols

There was very little high-level (level 1), quantitative evidence regarding the implementation of protocols in the ED and whether implementation improved prescribing habits long-term. Beaudoin, Janicki, Zhai, and Choo (2017), in their review of the literature, were also unable to determine whether opioid-prescribing policies differentially impacted providers in the ED based on earlier prescribing patterns or type of training a provider had (MD, PA, NP). Thus, they performed an interrupted time-series analysis of data obtained from three different hospitals within the same state before and after the implementation of an ED opioid-prescribing policy. Significant results from Beaudoin et al. (2017) showed declines in opioid prescribing at all three hospitals (decreased 8.5% at hospital 1, 1.3% at hospital 2, and 5.7% at hospital 3).

A detailed migraine algorithm implemented at the Cleveland Clinic in Ohio in 2013, dramatically cut the use of opioids for migraine management in their emergency department from 66% (before the algorithm) to 19% (after the algorithm), and decreased the prescribing of opioids at discharge (from 44% to 6%) as mentioned by Frei (2015). The rate of more than 50% pain relief remained constant at 63% before and after the protocol implementation (Frei, 2015). The Veteran's Healthcare Administration (VHA) implemented their Opioid Safety Initiative (OSI) in 2013, which led to nearly a third fewer veterans who received opioids this year as compared to 2013 (Fiore, 2017). Other facilities such as St. Joseph's Medical Center in New Jersey with their ALTO program, the Hamilton Medical Group in the United Kingdom, and the Institute for Clinical Systems Improvement (covering over 50 hospitals in Minnesota) have all implemented

opioid-alternative protocols to treat patients presenting to the ED with acute or chronic pain issues. On June 5, 2017, eight hospitals and three free-standing EDs launched an opioid pilot program based on St. Joseph's ALTO program (Blocker, 2017).

LaPietra et al. (2016) discussed how opioid-alternative protocols have been shown to standardize pain management between providers; improve patient pain control from the utilization of a balanced, therapeutic approach; improve patient satisfaction with improved pain control; potentially reduce a patient's length of stay; reduce opioid use in the ED and reduce opioid prescriptions at discharge; and most importantly, have shown they have the potential to reduce the possibility of opioid dependence and overdose for patients. The official research paper regarding the implementation of the ALTO program has been submitted to the *Annals of Emergency Medicine* for review and future publication (A. LaPietra, personal communication, October 2, 2017). However, A. LaPietra shared data showing their department had a relative reduction in opioids of 47% after implementation of the ALTO program, which she said was statistically significant without any difference in pain scores before and after implementation (personal communication, October 2, 2017). Specific results regarding treatment of migraine showed a decrease in opioid use when treating migraine from 10% use before implementation to 3% use after implementation (A. LaPietra, personal communication, October 2, 2017).

Because of the successful implementation of CERTA-based protocols and guidelines in the above-mentioned facilities, this project was developed to help determine whether an educational intervention could improve opioid knowledge among providers

(MDs, NPs, PAs) and nurses, reduce perceived barriers toward the implementation of an opioid alternative protocol for treating migraine in the ED, and help facilitate the future implementation of an opioid-alternative protocol for migraine in the emergency department.

The review of literature highlighted why current opioid-prescribing practices need to change, why education and communication strategies on improving provider prescribing practices is necessary, and suggested how pain management protocols have the potential to standardize care and reduce opioid use and misuse in an ED environment.

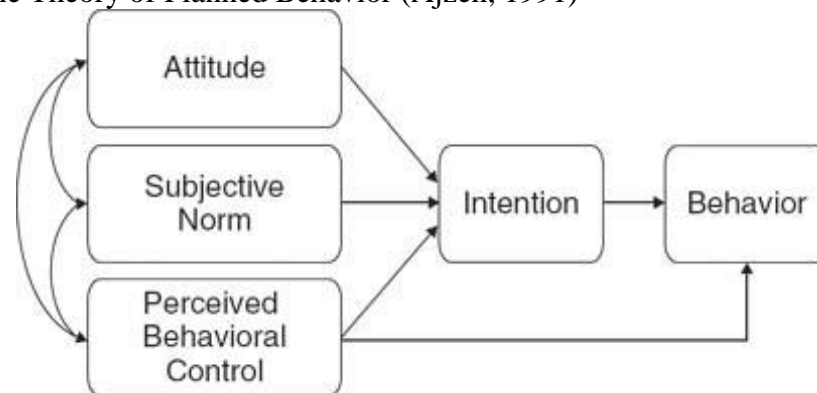
Using a theory to help explain decision-making behaviors can be useful when the goal is to identify and reduce perceived barriers to health-promoting interventions. Chapter three will briefly review the Theory of Planned Behavior for that purpose.

CHAPTER THREE

THEORETICAL UNDERPINNING

The conceptual framework chosen to guide this quality-improvement project was Isaac Ajzen's Theory of Planned Behavior (TPB). Polit and Beck (2012) support the use of TPB when the goal is to determine decision-making behaviors, as well as develop health-promoting interventions, as was needed for this project. TPB has been well-supported by empirical evidence and has indicated how intentions to perform a certain behavior can be predicted with high accuracy by first determining attitudes toward the behavior, subjective norms, and perceived behavioral control or a person's confidence in their ability to perform the behavior (Ajzen,1991). Those beliefs are outlined in Figure 1 below:

Figure 1. The Theory of Planned Behavior (Ajzen, 1991)



The “subjective norm” was defined by Ajzen (1991) as the “perceived social pressure to perform or not to perform the behavior in question” (p.188). For this project, it was important to identify what the subjective norm was for the prescribers and nursing staff in

a PNWH ED. It was also important to identify the attitudes of the providers and nursing staff regarding the opioid epidemic, current prescribing practices, and views of an opioid-alternative protocol for treating migraine in the ED, both before and after an educational intervention to assess for change. Most importantly, it was necessary to identify the barriers and facilitators (perceived behavior control) to the implementation of an opioid-alternative protocol because, if perceived behavioral control is lacking, it can help explain the failure to perform the behavior even when attitudes and subjective norms are positive (Ajzen, 1991).

CHAPTER FOUR

METHODS

The purpose of this quality improvement project was to evaluate whether an educational program could improve opioid knowledge among providers (MDs, NPs, PAs) and nurses, reduce perceived barriers toward implementation of opioid-alternative protocols in the ED, and help facilitate the implementation of an opioid-alternative protocol for migraine in the emergency department.

Ethical Issues

Institutional Review Board (IRB) approval was obtained from both Montana State University and the Pacific Northwest Hospital (PNWH) chosen for this project. The student investigator gained approval for this project from the student's DNP committee, the facility's nursing research council, and the governing board of the PNWH medical research committee in addition to gaining IRB approval.

Setting

This project took place in a Pacific Northwest ED in Eastern Washington during April and May, 2017. The facility is a full-service hospital with over 1,000 employees and more than 180 physicians. The ED has 34 beds and sees an average of 100 patients/day and over 65,000 patients/year.

Sample

For this project, a convenience sample was obtained using all emergency department prescribers (15 MDs, 1 DO, and 6 PAs) and nursing staff (84). Participants were chosen based on their role as either provider or nurse, and their current employment at the facility. Providers and nursing staff were invited to participate in the project via email invitation from a third party and were informed that participation in the project was optional and that all survey results were anonymous. All registered nursing staff and providers were invited to participate either on a work or home computer. All participants were English-speaking, not cognitively impaired, and were all able to provide implied consent. The only potentially identifying characteristics were whether the respondent was a nurse or a provider and how many years of experience they had in their role.

Intervention

Two surveys (pre and post) were developed in an effort to understand personal values and current practices that would welcome or hinder the implementation of an opioid-alternative protocol for managing migraine in the ED (Appendix E).

Pre-Educational Survey

The pre-educational survey was used to gather information from nurses and providers in a PNWH ED regarding current knowledge of the opioid epidemic, current practice regarding opioid use in the ED, and perceived barriers and facilitators to implementing an opioid-alternative protocol for treating migraine in the ED. Because the

surveys were created specifically for this project, reliability and validity information is not available. However, the survey was reviewed by the facility's IRB and was approved for this project.

All staff members (providers and nurses) received the same survey. Staff were invited to participate through email invitation from a third party explaining the purpose of the project and the survey, and ensuring anonymity of all responses. Responding to the survey implied informed consent and participation in all aspects of this project was voluntary. Survey respondents were given a 10-day period to complete the survey. A 60% response rate was expected, but a 20% response rate was deemed acceptable. Reminders to complete the survey were issued once by a third party and again by fliers posted in breakrooms and providers' mailboxes.

Educational Intervention

A proposed migraine-treatment protocol based on current protocols used by St. Joseph Medical Center and the Cleveland Clinic, as well as additions based on current, evidence-based treatment guidelines for migraines, was developed by the student investigator in collaboration with the ED medical director. The proposed protocol utilized common opioid-alternative medications known to treat migraines and included evidence-based information supporting all medications. A hard copy version of the protocol was provided to all staff. A 20-minute, Mediasite PowerPoint presentation was sent to all ED nurses and providers by a third-party email invitation two weeks after the initial survey invitation. The PowerPoint included information on the opioid epidemic, key points from existing opioid and migraine-treatment guidelines, the proposed protocol including

detailed information on each step of the protocol and medications used, and information regarding other facilities' successful implementation of opioid-alternative protocols. The Mediasite presentation was intended to be completed at home or at work depending on the participant's preference. Due to problems staff had with downloading the Mediasite presentation, the PowerPoint was emailed to all staff, a printed copy for staff review was made available in breakrooms and patient care areas, and a printed copy was provided for each ED provider in their personal mailbox.

Post-Educational Survey

The post-educational survey was developed to assist the student investigator in evaluating whether the educational intervention was effective at improving opioid knowledge among providers (MDs, NPs, PAs) and nursing staff, identifying and reducing perceived barriers toward the implementation of an opioid alternative protocol for treating migraine in the ED, and helping to facilitate the future implementation of an opioid-alternative protocol for migraine in the emergency department. The post-educational survey results were also meant to help determine what further interventions must occur, if any, prior to implementing the opioid-alternative protocol in the ED.

The post-educational survey was administered following the educational intervention. A link was provided in the educational intervention email invitation sent to providers and nursing staff. Participants were given the option to complete the survey immediately after watching the educational intervention, or to complete the survey within 10 days of the educational intervention. Reminders were administered in the same manner as the pre-educational survey. The expected outcome after the educational

intervention was increased knowledge regarding the opioid epidemic, how the ED can reduce opioid use and misuse in our community, and a decrease in perceived barriers toward the implementation of an opioid-alternative protocol for migraine in the ED.

Analysis

A total of 31 nurses (37%) and 9 prescribers (40%) responded to the pre-survey, while only 18 nurses (21%) and 5 prescribers (23%) responded to the post-survey. Not all of the questions were answered by every respondent, so sample sizes for all questions analyzed in this project have been provided for reference. There were also survey system issues regarding question 14 wherein respondents were credited with more than one response per statement (e.g., Strongly Disagree and Strongly Agree). This was assumed to be a random error and those responses were eliminated, but the errors could have been systematic errors, which would bias the results.

Results from the pre-educational and post-educational surveys were quantitatively compared with bar graphs and pie charts provided by Survey Monkey using simple data analysis and by the Montana State University Statistical Consulting and Research Services (SCRS). SCRS used plots generated using R to answer specific questions of interest (questions 8, 12, 13, and 14). Open-ended questions and comparisons of barriers were plotted qualitatively using affinity diagrams. The charts were used to assess for changes in answers before and after the educational intervention. By comparing charts and affinity diagrams, the effectiveness of the intervention in increasing ED nurse and provider knowledge regarding current opioid and migraine-management guidelines and

the effective alternatives to opioids in managing patients who present to the ED with known history of migraine were assessed. By evaluating the affinity diagrams before and after the intervention, it was possible to identify whether there was a reduction of perceived barriers and increased support for the implementation of an opioid-alternative protocol for treating patients with migraine in the ED.

CHAPTER FIVE

RESULTS

Background Information from Participants

Results were summarized and shared with the nursing manager and the medical director of the ED. Those results are presented below by way of survey questions. Each survey question is described, followed by the pre- and post-response analysis.

The first question asked in both surveys served solely to identify the role of the respondent as a nurse or a prescriber. Thirty-seven percent of nursing staff and 40% of prescriber staff responded to pre-survey questions; 21% of nursing staff and 23% of prescriber staff responded to the post-survey questions.

The second question from the surveys evaluated the years of experience for all respondents to the surveys. The answers do not explain any differences in results and are simply for the informational interest of the student investigator. Figure 2 shows 32% of respondents had 5-10 years of experience and only 40% had over 10 years of experience while Figure 3 shows over 52% of respondents had greater than 10 years of experience.

Figure 2. Pre-Educational Survey: Question 2.

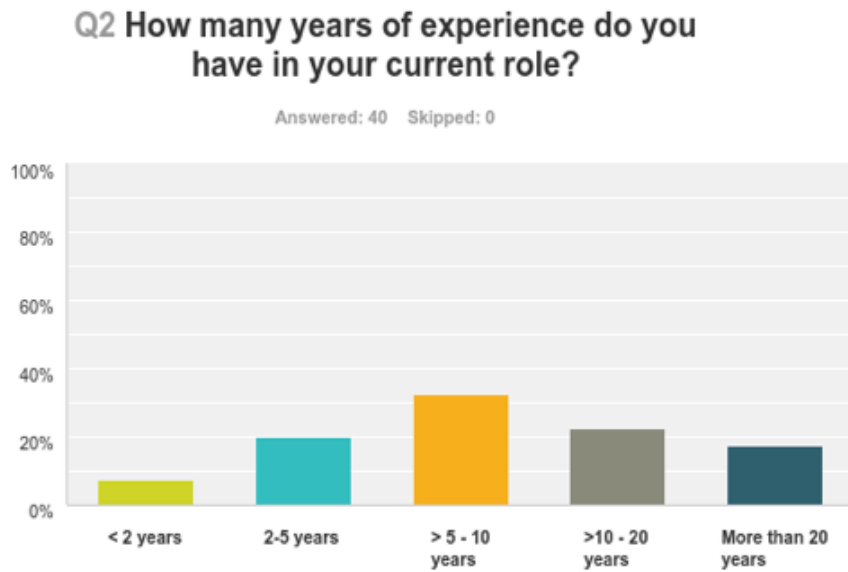
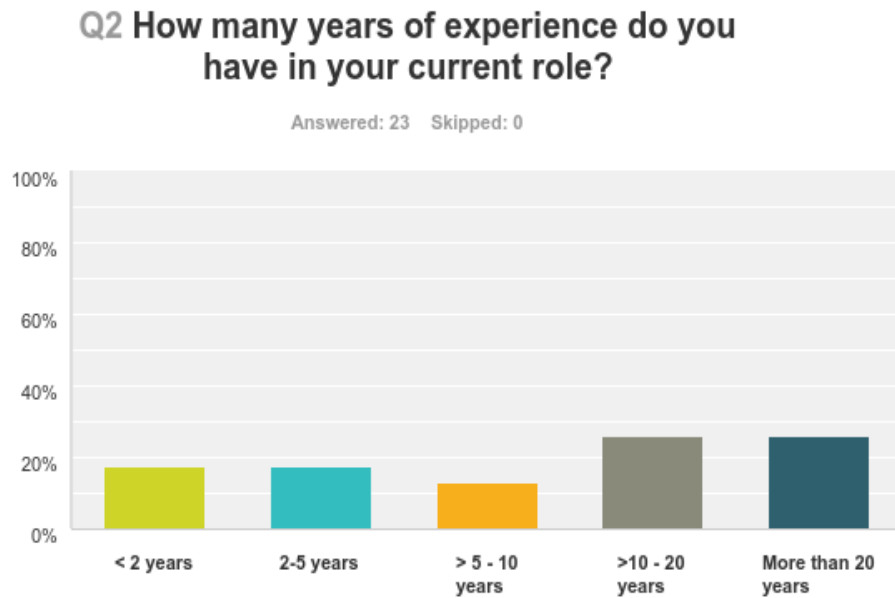


Figure 3. Post-Educational Survey: Question 2.

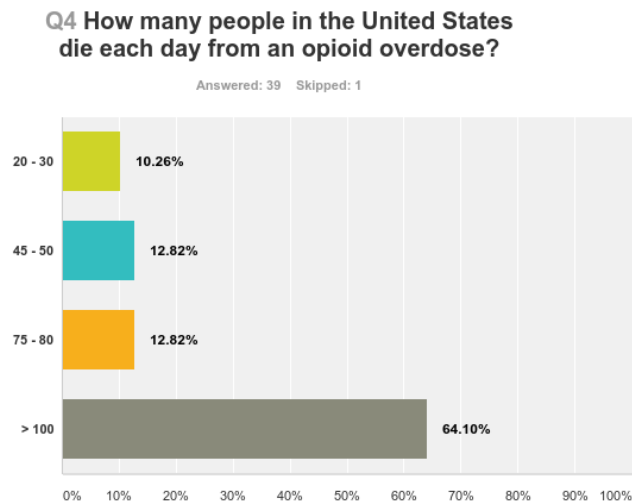


Respondent's answers to Question 3 for both the pre- and post-educational surveys assessed current opinion related to the extent they viewed opioid misuse a problem in the patient population they served. The responses averaged a 7 (Rating scale 0-10, with 10 being the absolute worst and 0 being no problem), which indicated most respondents viewed opioid misuse a significant problem in this community.

Increased Opioid Knowledge

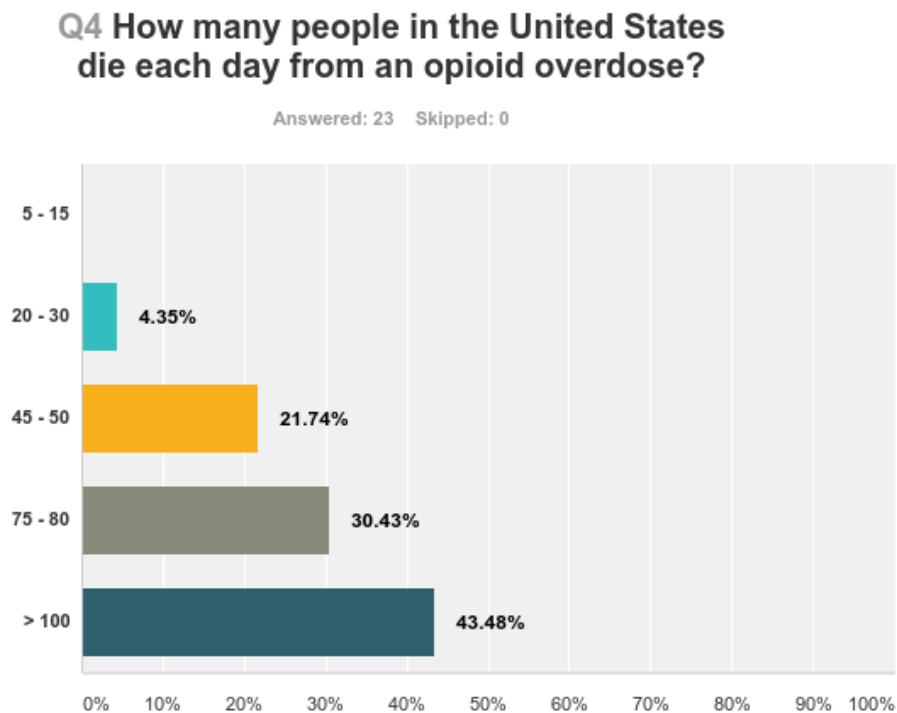
Comparing survey answers before and after the educational intervention allowed the student investigator to evaluate whether the educational intervention achieved its intended goal of increased opioid knowledge. The pre-survey revealed most respondents overestimated the number of daily deaths from opioid overdoses as greater than 100 (64% of respondents), while answering the question correctly (answer 78) only 12% of the time (Figure 4).

Figure 4. Pre-Educational Survey: Question 4.



After the educational intervention 43% of respondents still overestimated the number of daily deaths, while 30.43% of respondents chose the correct answer (78), indicating some improvement in knowledge after the education (Figure 5).

Figure 5. Post-Educational Survey: Question 4.

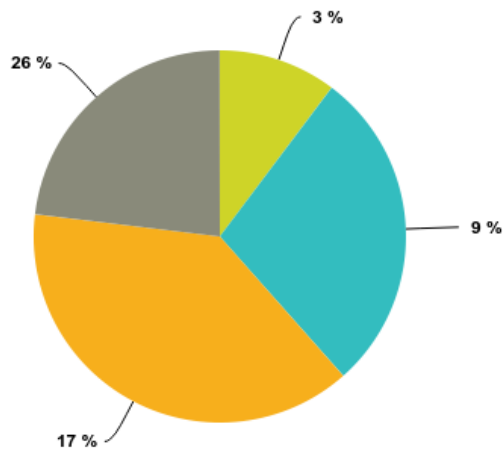


Pre-education survey results showed participants choosing 17% as the correct answer to question 5 (38.46% of the time, or 15 of 39 respondents), with underestimation occurring 38% (15 of 39) of the time and overestimation 23% (9 of 39) of the time (Figure 6).

Figure 6. Pre-Educational Survey: Question 5.

Q5 What percentage (%) of patients initially filling an opioid prescription for a minor painful condition in the emergency department are still taking opioids one year after that initial ED visit?

Answered: 39 Skipped: 1

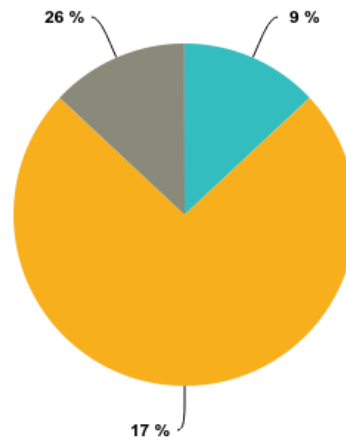


After the educational intervention, the correct answer was chosen 73.91% (17 of 23 respondents) of the time, while overestimation and underestimation both decreased to 13% (3 of 23) of the time, indicating improved knowledge post education (Figure 7).

Figure 7. Post-Educational Survey: Question 5.

Q5 What percentage (%) of patients initially filling an opioid prescription for a minor painful condition in the emergency department are still taking opioids one year after that initial ED visit?

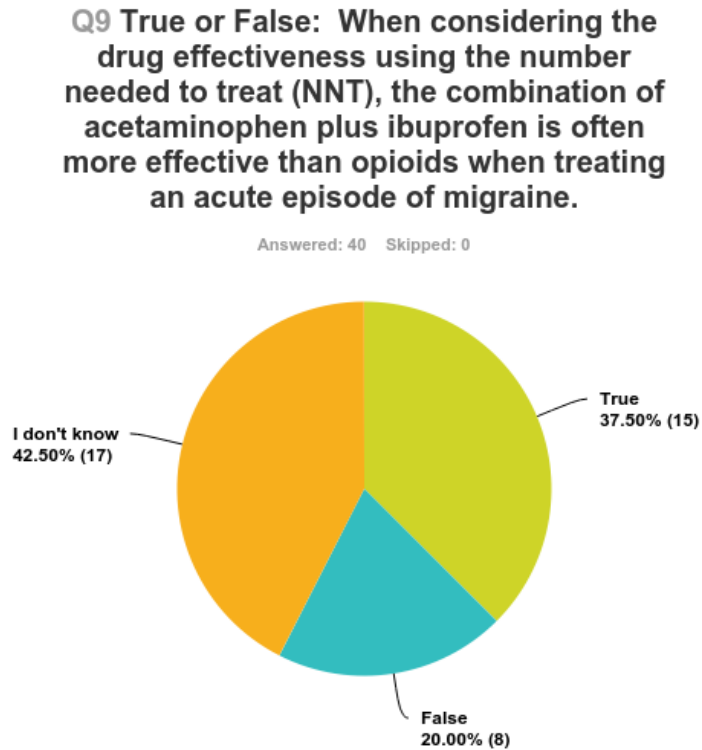
Answered: 23 Skipped: 0



Data from both surveys showed no significant difference in the answers to Q6 related to current national guidelines and the treatment of acute pain related to migraine with opioids. Both surveys showed over a 90% correct answer response, with the outlier being “I don’t know.”

Question 9 assessed participants’ knowledge of the effectiveness of medications based on the number needed to treat (NNT). Pre-survey results showed participants believed the statement was true that mentioned a combination of acetaminophen plus ibuprofen was often more effective than opioids when treating an acute episode (37.5%), 20% of respondents thought the statement false, and 42.5% of the respondents didn’t know (Figure 8).

Figure 8. Pre-Educational Survey: Question 9.

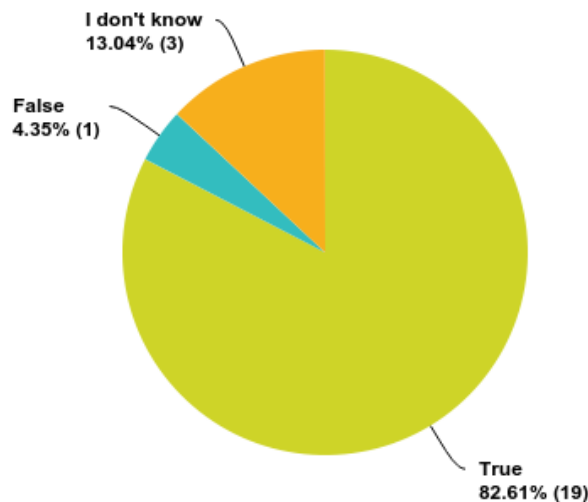


Information gleaned from Figure 9 showed an increased knowledge after the educational intervention as determined by an increase in “True” answers (82.6%), and a decrease in “False” (4.3%) and “I don’t know” answers (13%).

Figure 9. Post-Educational Survey: Question 9.

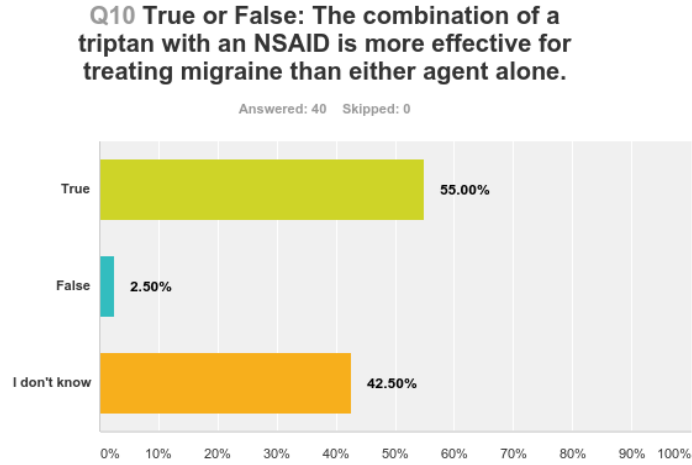
Q9 True or False: When considering the drug effectiveness using the number needed to treat (NNT), the combination of acetaminophen plus ibuprofen is often more effective than opioids when treating an acute episode of migraine.

Answered: 23 Skipped: 0



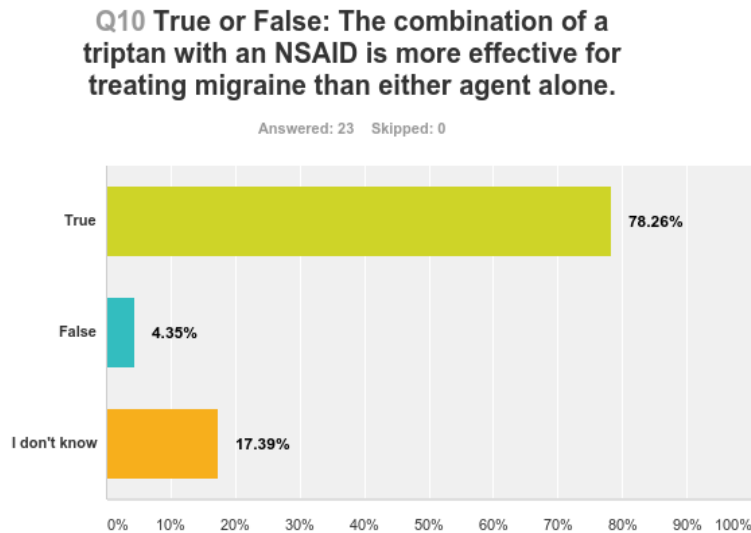
Question 10 survey results showed similar indications of improved knowledge after the educational intervention as evidenced by improved results from the pre-survey (Figure 10) to the post-survey (Figure 11). The pre-survey showed 55% of the participants correctly identified the statement as true, 2.5% (or 1 participant) believed the statement false, and 42.5% didn't know the correct answer.

Figure 10. Pre-Educational Survey: Question 10.



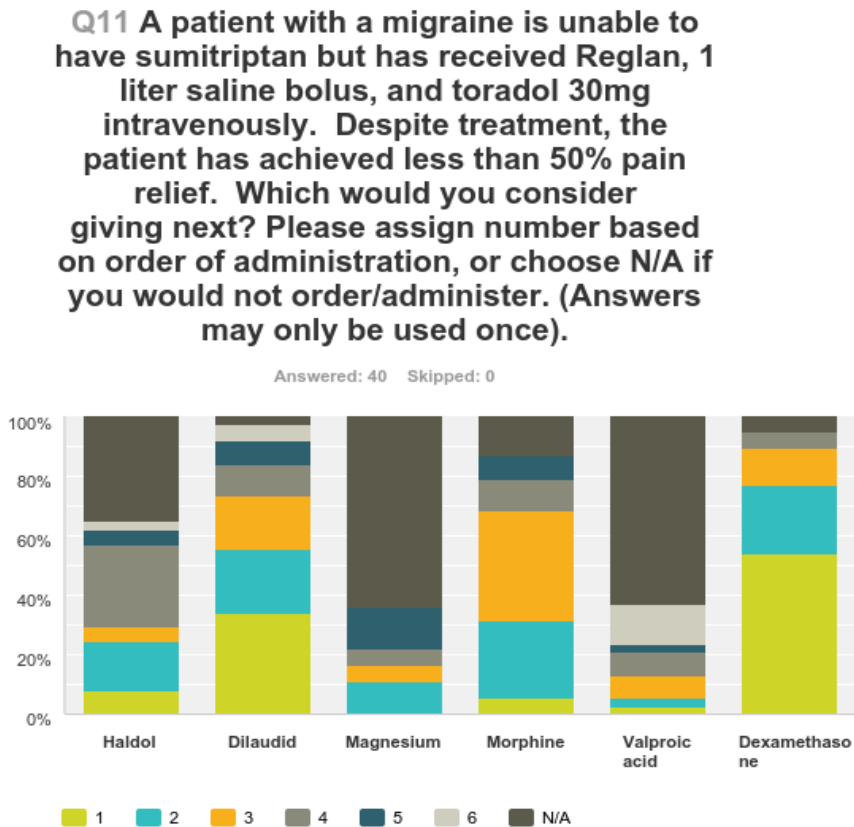
The post-survey showed an increased incidence of respondents who chose true as the correct answer (78.3%), 4.35% (or 1 participant) still chose false, and fewer respondents (17.4%) chose “I don’t know.”

Figure 11. Post-Educational Survey: Question 10.



Question 11 on the pre-survey was developed to identify how soon opioids were chosen when a standard protocol already in use in the ED did not work to alleviate a patient’s migraine, and also to identify which alternatives were currently being utilized by providers. The pre-survey results (Figure 12) showed Dexamethasone was the most common first choice (53.8%), Dilaudid the second most common first choice (34.2%), and then, magnesium (11%). Common alternatives on the proposed opioid protocol were marked as N/A (Haldol 35%, Magnesium 63%, and Valproic Acid 63%). Morphine was not often a first choice, but it ranked high as second and third choices (26% and 36% respectively).

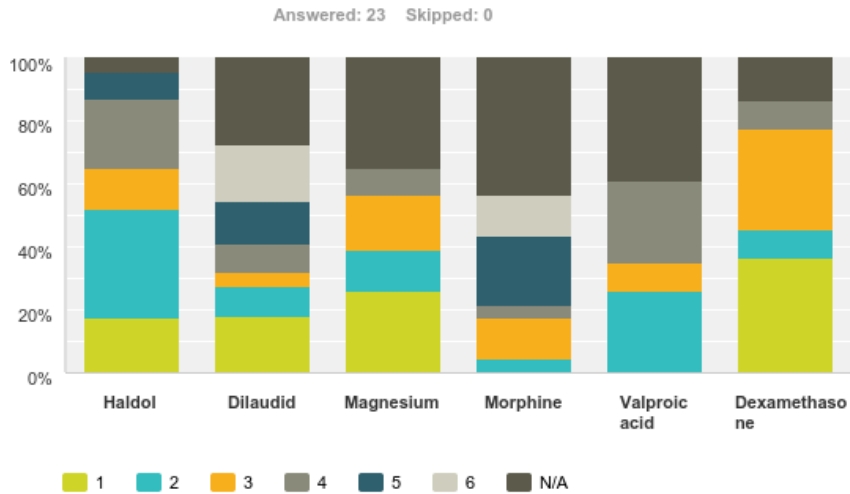
Figure 12. Pre-Educational Survey: Question 11.



Asking the same question on the post-survey was meant to identify whether the educational intervention changed how soon opioids were chosen as a next medication option and whether alternatives were more frequently chosen. Figure 13 identified how answers changed after the educational intervention.

Figure 13. Post-Educational Survey: Question 11.

Q11 A patient with a migraine is unable to have sumatriptan but has received Reglan, 1 liter saline bolus, and toradol 30mg intravenously. Despite treatment, the patient has achieved less than 50% pain relief. Which would you consider giving next? Please assign number based on order of administration, or choose N/A if you would not order/administer (please use each answer only once).



Medications previously marked as N/A in the pre-survey decreased significantly (Haldol 35% to 4.35%, Magnesium 63.89% to 34%, and Valproic Acid 63% to 39%).

Valproic acid was used as second and fourth choices 26% of the time. Haldol was also

used more frequently and earlier on in the choices (17%, 34%, and 13% for choices 1, 2, and 3 respectively). First-choice medications also changed in order of administration, although Dexamethasone remained first choice most frequently (Dexamethasone 36%, and valproic acid and magnesium 26%). Dilaudid remained a common first choice, but the percentage of participants who chose it as first-line decreased from 34% to 18%, and it was often chosen later in the timeline (choices 5 and 6). The most surprising result on the post-educational survey was that Dilaudid and Morphine were chosen as N/A on the timeline 27% and 43% of the time respectively. Although perhaps not statistically significant due to the small sample size, comparison of data showed a decreased tendency to use opioids early on in treatment after the educational intervention, and an increased likelihood of trying alternative medications first.

Reduction in Perceived Barriers

Question 7 (Q7) was asked to determine the comfort level of an alternative and rarely given medication (ketamine) for migraines, as well as for chronic pain. Data from both surveys showed an increase in the comfort level (from 3 to 5) in terms of using ketamine for the treatment of migraine in the emergency department (Figures 14 and 15). This indicates increased knowledge regarding an intervention can decrease the barriers toward performing the intervention.

Figure 14. Pre-Educational Survey: Question 7.

Q7 What is your comfort level regarding the use of intranasal or intravenous ketamine in sub-dissociative or low doses for the treatment of migraine in the emergency department? (0 = not comfortable at all, 10 = very comfortable)

Answered: 37 Skipped: 3

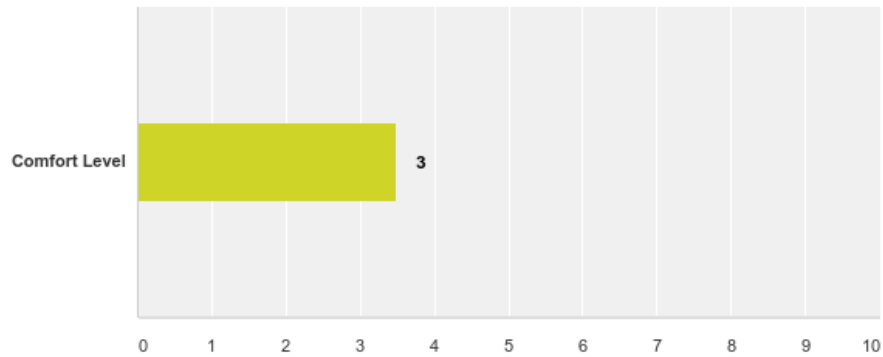
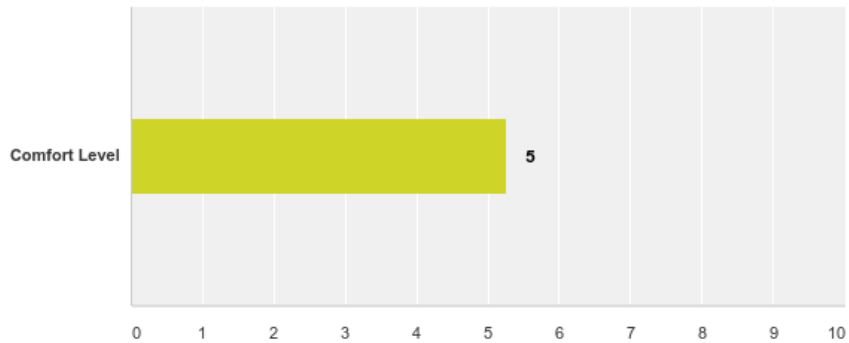


Figure 15. Post-Educational Survey: Question 7.

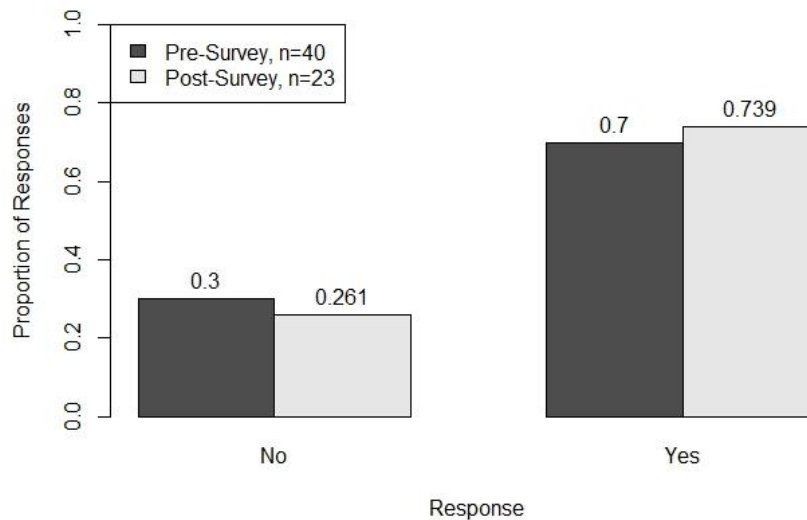
Q7 What is your comfort level regarding the use of intranasal or intravenous ketamine in sub-dissociative or low doses for the treatment of migraine in the emergency department? (0 = not comfortable at all, 10 = very comfortable)

Answered: 23 Skipped: 0



Question 12 (Figure 16) showed no significant change in responses after the educational intervention. In the pre-educational survey 70% (28 of 40) of respondents were aware of opioid-alternative protocols for use in the ED, while 30% (12 of 40) were not aware. In the post-educational survey there was a slight increase in awareness of protocols with 74% (17 of 23) of respondents answering “yes” to the question.

Figure 16. Question 12: Are You Aware that Opioid-Alternative Protocols Exist for Utilization in the ED?



Question 14 on the pre-educational survey was developed to identify existing barriers toward the implementation of an opioid-alternative protocol for treating patients with migraine in the ED. A set of hypothesized barriers was developed by the student investigator along with open-ended questions. An affinity diagram was constructed by grouping the open-ended responses from respondents' comments into commonly identified barriers. Comments were grouped into the following categories:

1. Provider Issues
2. Protocol Issues
3. Patient Issues

Table 2. Pre-Educational Survey: Perceived Barriers to Opioid-alternative Protocols.

Provider Issues	Protocol Issues	Patient Issues
I generally do not prescribe narcotics for home use for headaches	Too time-consuming and too high of a rate of failure and ultimately require narcotic rescue.	Each patient has an individual history, presentation, and medication constraints such that a cookie cutter template will not work
We are part of the problem. We need to decrease the distribution in the ED.	Rarely is there enough time to trial one tactic after another in serial fashion until a level of relief is achieved.	Most migraine patients report allergies to "all NSAIDS," "Tylenol doesn't work for me," "the only thing that works is Dilaudid and they usually have to give me 3 doses and 2 bags of IV fluids"
I have had a few patients that will get relief with the Benadryl, dexamethasone, Reglan protocol, but it takes a lot of coaching and convincing on my part to get them to even try it.	Migraines are one of those complaints where a quick treatment and disposition is good for the doctor and the patient. Protocols that keep the patient in the ED for hours, taking up a bed that could be better utilized for sicker patients is not efficient. I'm all for non-narcotic treatment but there should be some time sensitivity involved.	Some patients do come in for migraine treatment that have done all their home treatments with no relief and are ONLY looking for Dilaudid or another type of narcotic/opiate for relief and are very upset if they do not get it.
Our doctors are moving away from opioids to treat migraines; however we have not been introduced to an alternative protocol.	I worry that a protocol with multiple steps will prolong ED stays,	There is a subset of migraine patients that have come to expect narcotics and don't want to try anything new
Our pattern of inconsistency as a group on avoiding narcotics does not help	Patients are in the ED a long time if you follow the protocol	There are many patients who are not open to conversation about why you don't want to use the medication (usu Dilaudid) that they have come to know is "the only thing" that will help them. They particularly don't want to talk about it when they are miserable.
It will ultimately be up to the doctor to change the practice in overly prescribing narcotics.	Some patients have "Migraines" that have other underlying origins and these protocols will not be effective. However, these are outliers and should not impact the overall change.	Some patients will be very unpleasant and will stop at nothing to have opiates ordered. No amount of alternative will stop the people who only want opiates
Some providers will treat with non-narcotics-the pt. will continue to c/o pain. MD will provide one dose of narcotic-pt. will be satisfied then discharge. other providers will refuse to give narcotics, the patient will leave mad. This same patient will come back and receive narcotics from another provider several days later.	Time to administer meds and evaluate each individually before going to opiates would extend treatment times.	

By asking the same questions in the post-educational survey, the assumption was that a reduction in barriers toward the implementation of the protocol would occur. Comments were similar in the post-survey to Question 14 as they were in the pre-survey, although comments leaned more toward patient issues than provider issues. Responses were again grouped into an affinity diagram (Table 3).

Table 3. Post-Educational Survey: Perceived Barriers to Opioid-alternative Protocols.

Provider Issues	Protocol Issues	Patient Issues
I see a lot of MD's who are quick to pacify a patient who wants opiates. It usually just takes some complaining and they tend to cave. In general, the providers want to turn over these patients as quickly as possible	I think that going through the protocol will take more of my and nursing time as well as the cost of giving multiple medications.	I think we would still need some kind of approach to deal with chronic opioid users who challenge the protocol, or say "ibuprofen and Tylenol don't work for me, or request a different doctor, threaten staff with violence or retribution if they are not given what they want, or report on the Press Ganey that their pain was not adequately managed in a timely way, and consequently implying that the nurses and the doctors did not show care and respect.
The workup for concerning headache can take hours sometimes and there are many contraindications to recommended first line treatments. This could lead to providers being unwilling to follow this type of treatment protocol until after they are convinced of the diagnosis.	Migraines are a patient problem that is typically relatively easy to "treat and street." With the protocol I can see this resulting in a greater time in the ER and more labor intensive for the nurses.	Some patients that believe only narcotic medications will help their pain.
.	Patient with typical migraine, no atypical features and no concerning findings on history or physical examination would obviously benefit from opioid-alternative protocol.	The other is overcoming patients' expectations that they will receive narcotics for their headaches
	You have too many double negative questions	Patient factors, I'm sure that a lot of the non-narcotics would start showing up on allergy lists.
		Patient desire for narcotics

After the educational intervention, there was reduction in perceived barriers as seen by increased agreement to the following:

- Agreement with current national guideline recommendations (32% to 55%, Figure 19).
- Seeing a need for current prescribing practice to change (85% to 96%, Figure 20).
- Agreeing with the efficacy of protocols in general (41% to 62%, Figure 21).
- Familiarity with the procedure for using and administering the alternative medications (38% to 57%, Figure 22).
- The rationale for implementation of this protocol was clarified (50% to 91%, Figure 23).
- Acknowledging that the protocol would not be burdensome on my time (58% to 74%, Figure 24). Individual respondent comments to this question can be found in Appendix B.

Figure 17. Question 14: I Disagree with the Current National Guideline Recommendations.

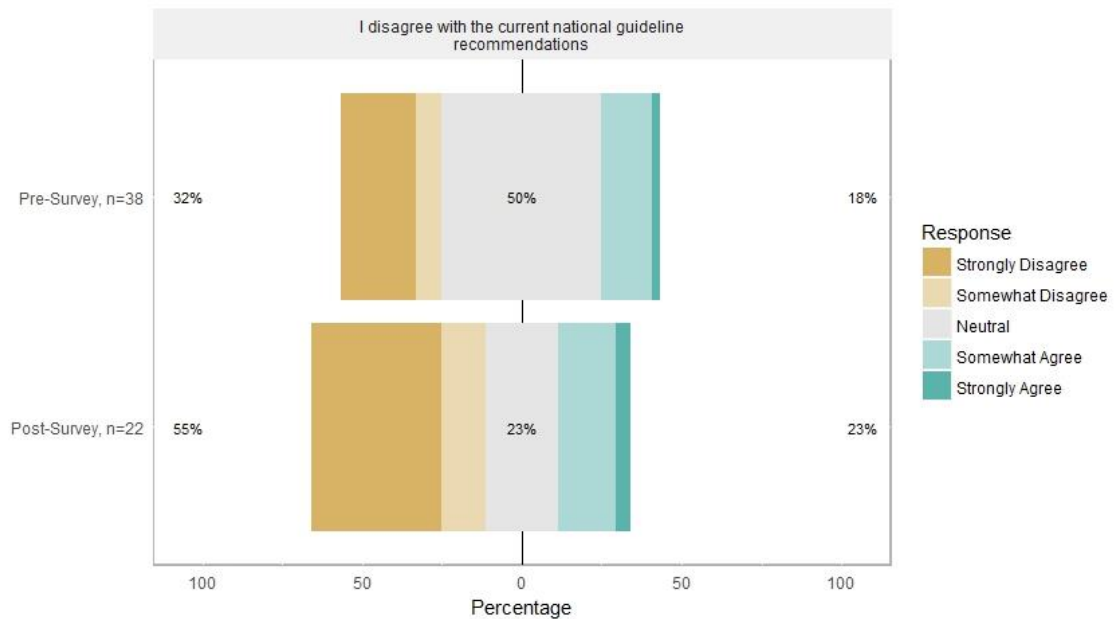


Figure 18. Question 14: I Don't See a Need for This to Change.

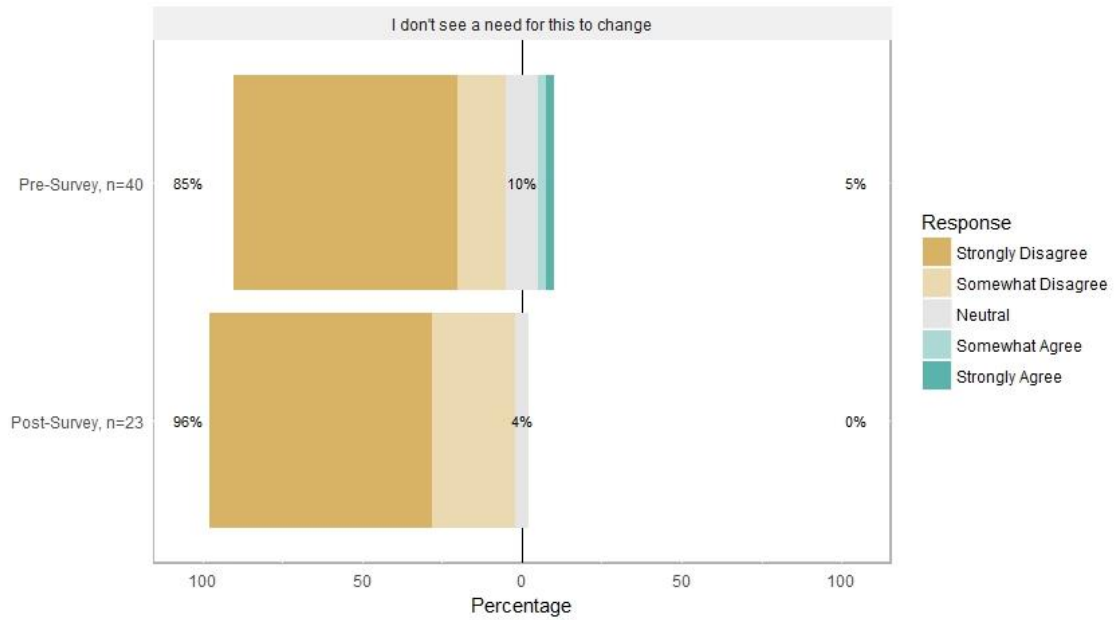


Figure 19. Question 14: I Believe There is a Lack of Efficacy of Protocols in General.

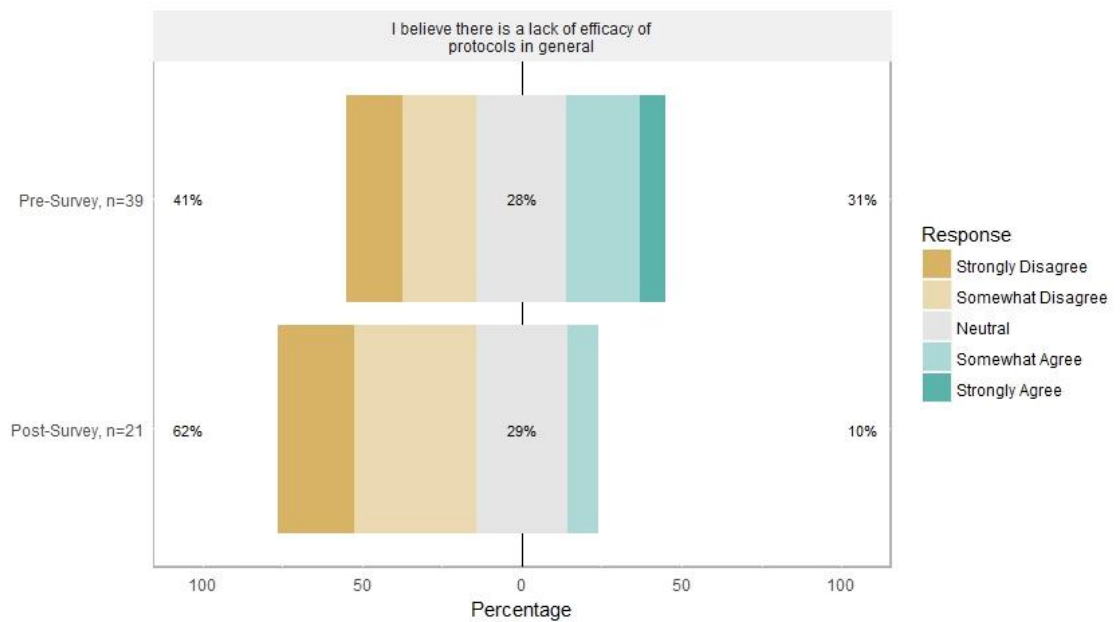


Figure 20. Question 14: I am Unfamiliar with the Procedure for Using and Administering the Alternative Medications.

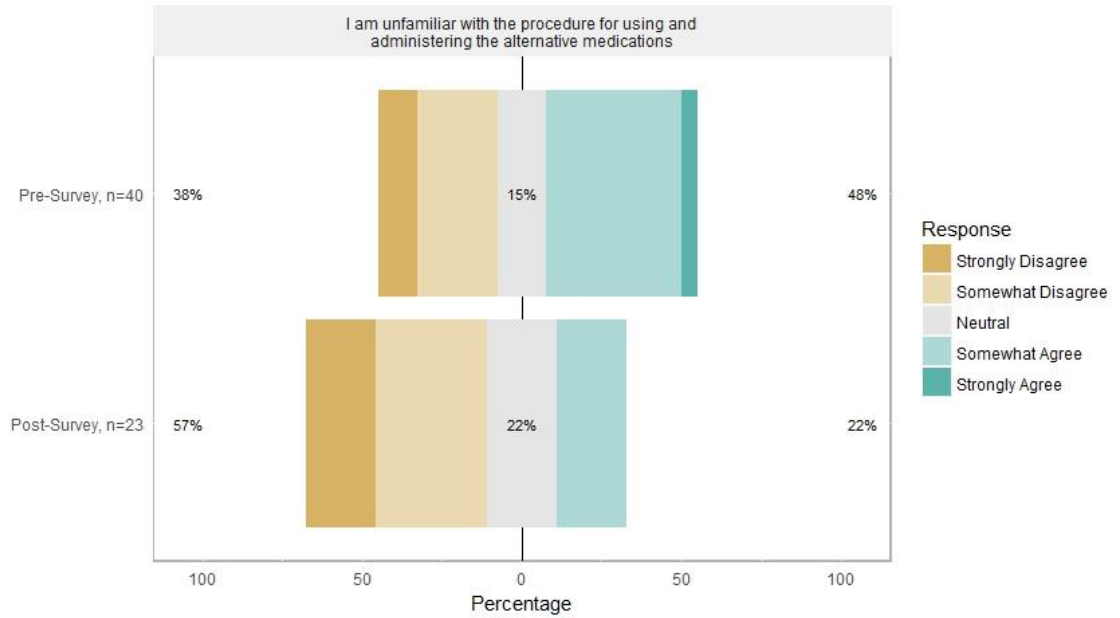


Figure 21. Question 14: The Rationale for Implementation of this Protocol is Vague and Unclear.

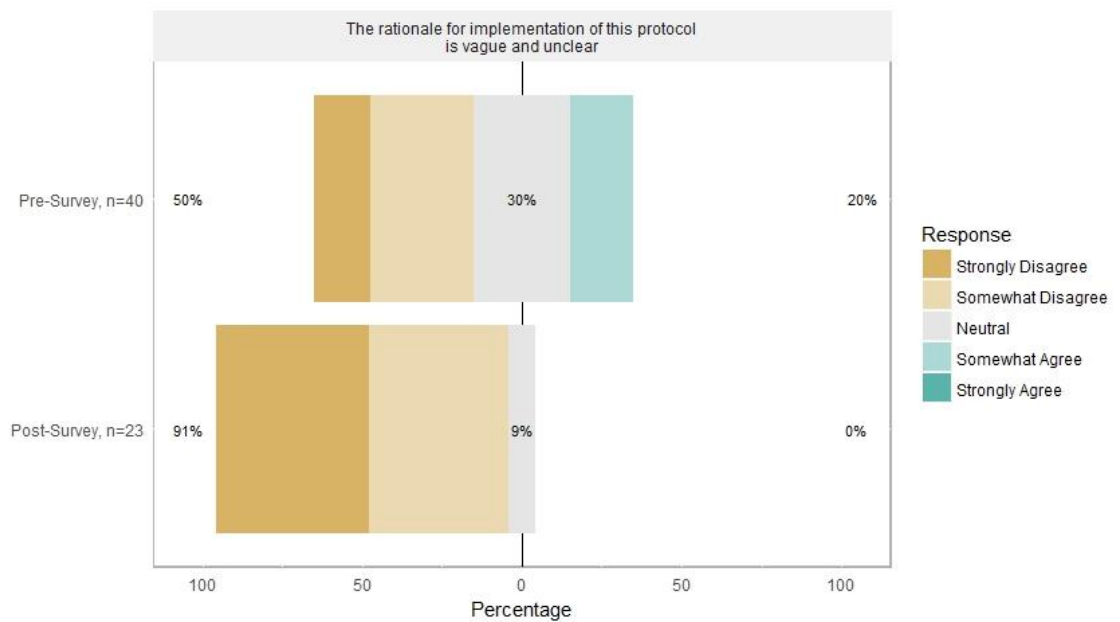
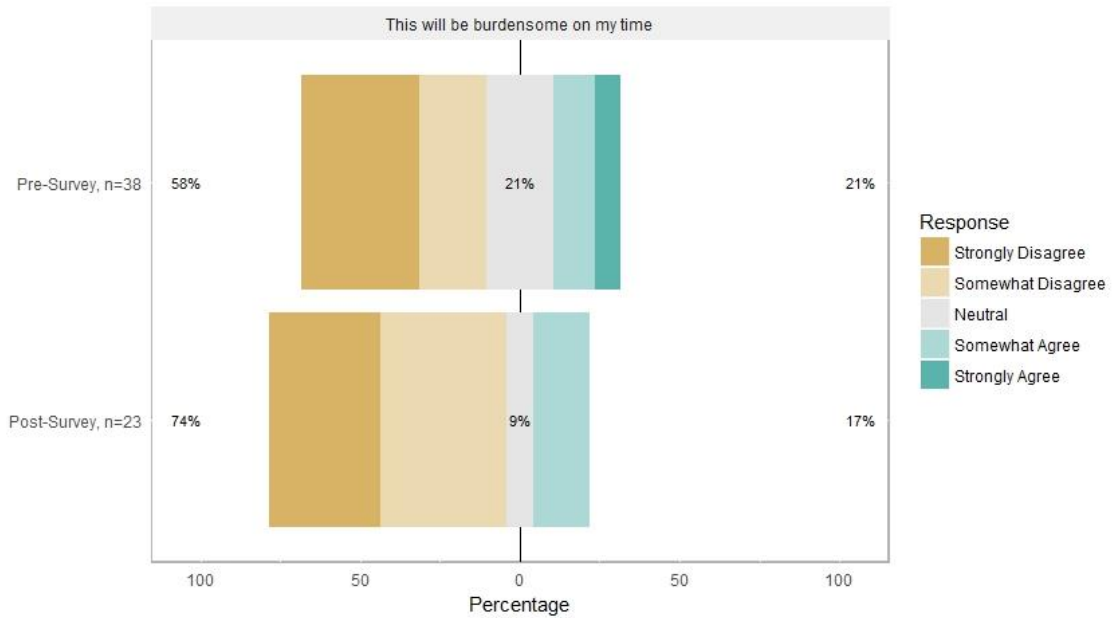
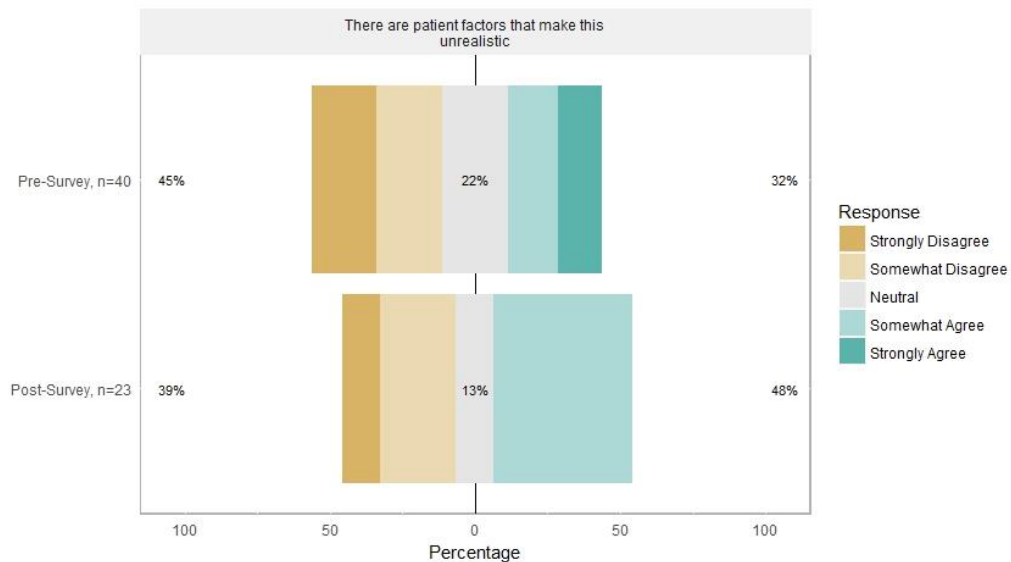


Figure 22. Question 14: This will be Burdensome on my Time.



There was an increase in agreement for the statement “There are patient factors that make this unrealistic” (32% to 48%), showing patient factors are more concerning than other factors in successfully implementing the protocol (Figure 23).

Figure 23. Question 14: There are Patient Factors that Make this Unrealistic.



There was very little change in perception after the educational intervention concerning the following statements:

- An opioid alternative does not apply to the ED environment (Figure 24).
- I would support implementation of an alternative protocol (Figure 25).
- I don't believe there are any barriers to implementing an alternative protocol (Figure 26).
- I am concerned reimbursement for alternative medications may be problematic (Figure 27).

Figure 24. Question 14: An Opioid Alternative does not Apply to the ED Environment.

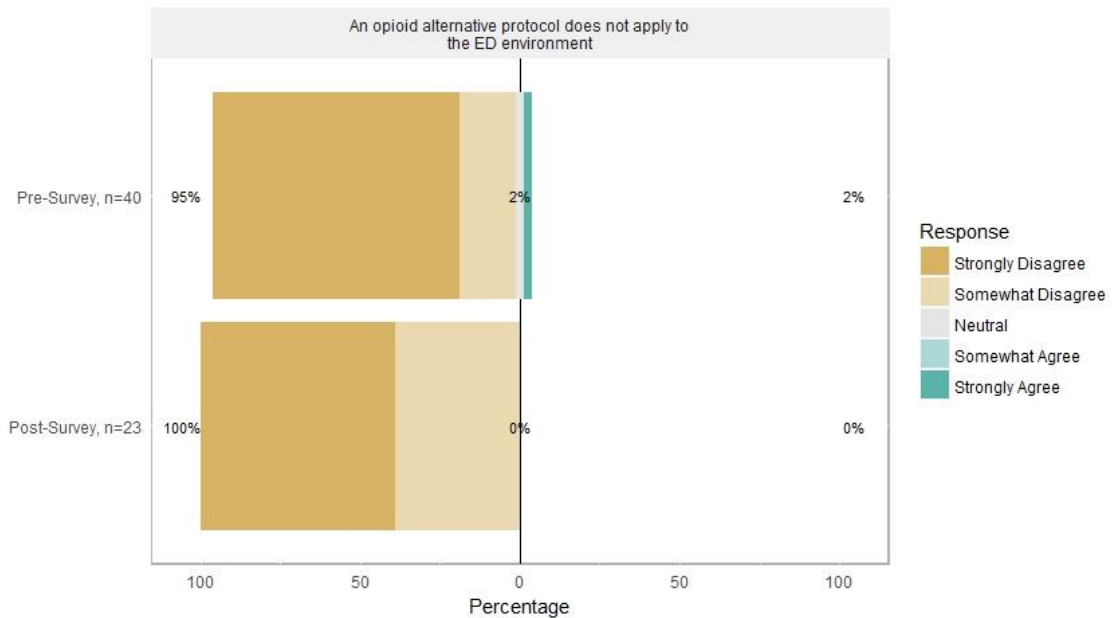


Figure 25. Question 14: I Would Support Implementation of an Alternative Protocol.

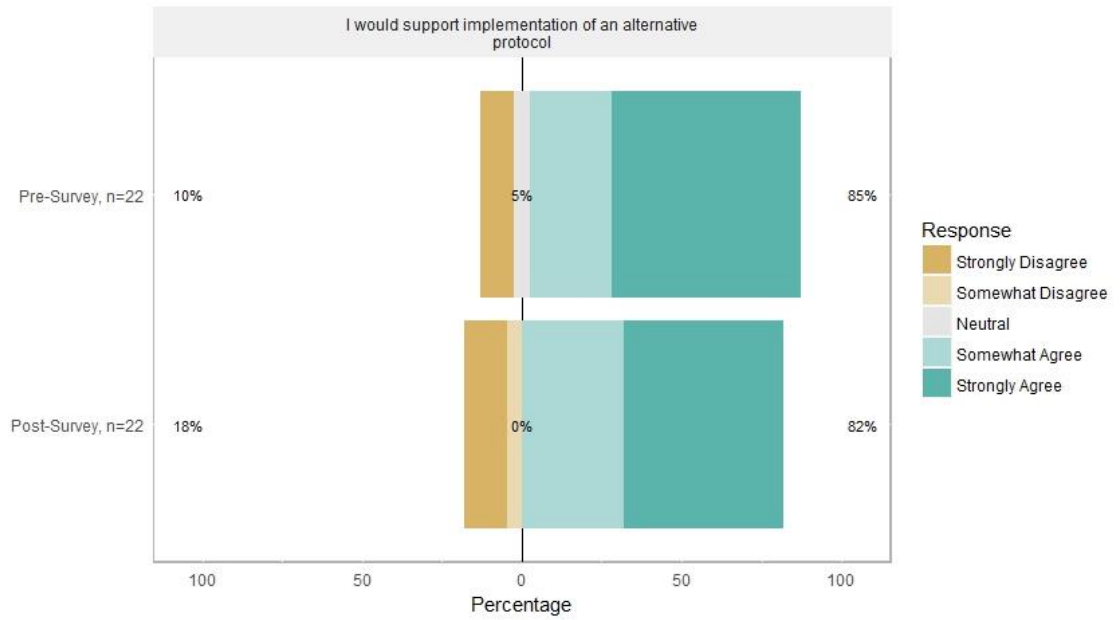


Figure 26. Question 14: I Don't Believe There are Any Barriers to Implementing an Alternative Protocol.

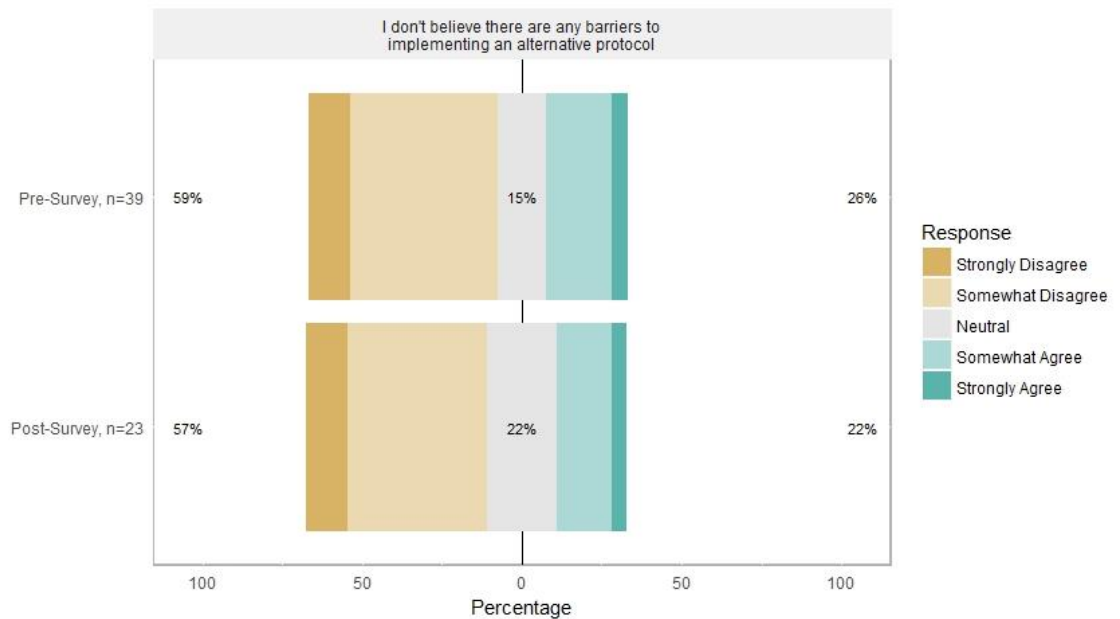
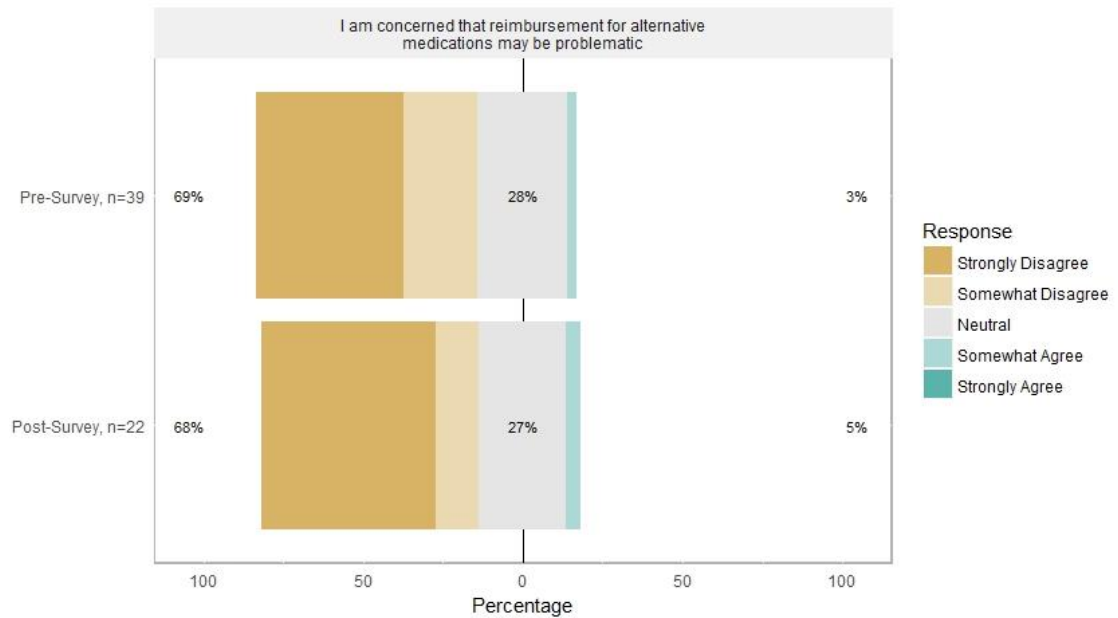


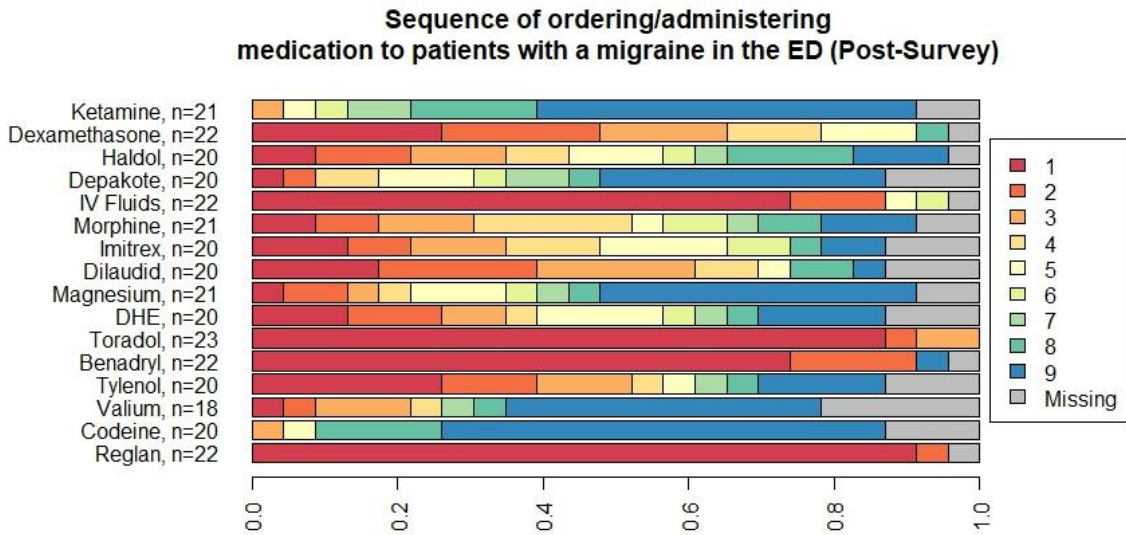
Figure 27. Question 14: I am Concerned that Reimbursement for Alternative Medications may be Problematic.



Help Facilitate the Implementation of an Opioid-alternative Protocol

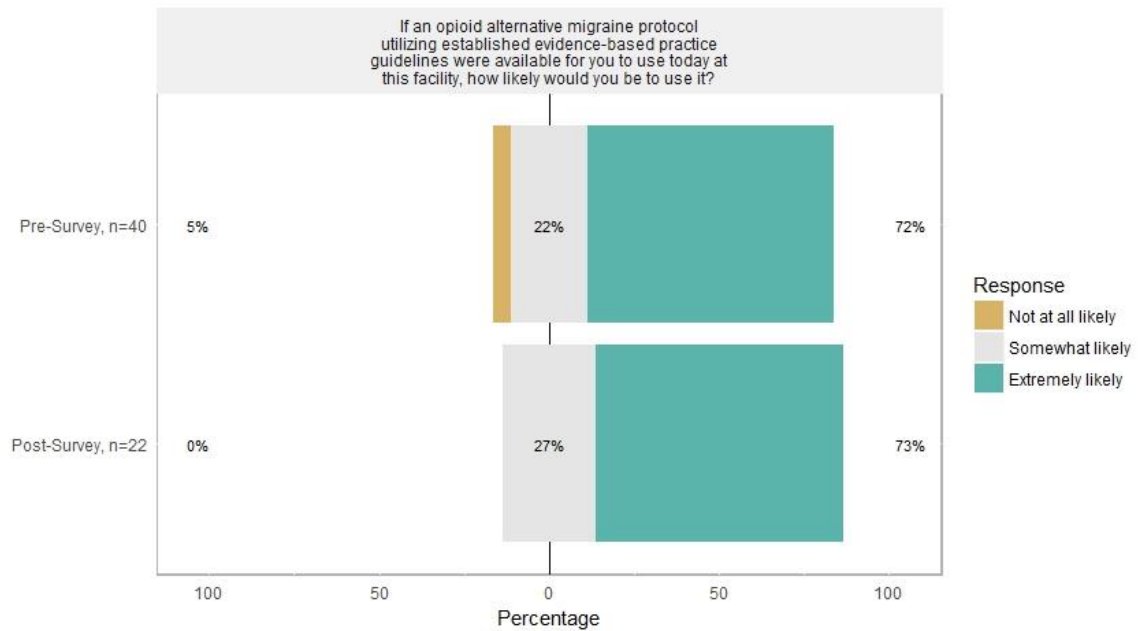
Questions 8, 13, and 15 were designed to evaluate whether the educational intervention helped to facilitate the future implementation of an opioid-alternative protocol for treating patients with migraine in the ED. Question 8 was asked to help determine current medication sequences and types of medications typically used when treating patients in the ED. The post-survey was meant to determine if the sequence and the type of medications changed after the educational intervention. Following the educational intervention, Figures 28 and 29 show respondents were more likely to order and/or administer Reglan, Tylenol, Dexamethasone, and Toradol earlier in the sequence. They were also more likely to order and/or administer Codeine and ketamine later, if at

Figure 29. Post-Educational Survey: Question 8.



Question 13 sought the likelihood of usage of an alternative protocol if one was available for use currently in the ED. Prior to the educational intervention, 72.5% (29 of 40) were “extremely likely” to use a protocol, 22.5% (9 of 40) were “somewhat likely,” and 5% were “not at all likely” to use a protocol. Figure 30 shows minimal changes after the educational intervention in the proportion of respondents who would be “extremely likely” to use an opioid-alternative protocol. However, the proportion of respondents who were “not at all likely” decreased to zero and the proportion of respondents “somewhat likely” increased from 23% to 27%.

Figure 30. Question 13.



Question 15 was designed as an open-ended response to help identify what factors respondents felt would increase the likelihood of successful implementation of the opioid-alternative protocol for migraine in the emergency department. Responses were similar and were grouped the same in the pre-survey (Table 4) and the post-survey (Table 5), with the exception of a column related to research not being included in Table 5. Not every respondent chose to answer this question; but a majority chose to answer in the pre-survey (29 of 40 respondents, or 72.5%), and in the post-survey (16 of 23, or 69.5%).

Analyzing respondent comments from Question 15 helped categorize the circumstances that could prohibit change and assisted in identifying areas of improvement for future studies. The identified areas of improvement will help guide the next steps for the implementation of this protocol, as well as other opioid-alternative protocols, in the ED. The factors most commonly chosen for areas of improvement

included ensuring protocol adherence and compliance by all providers and improving patient and nursing education regarding the protocols.

Table 4. Pre-Educational Survey: What would need to change or be improved upon to increase the likelihood of successful implementation?

Protocol adherence/compliance	Buy-in from providers and management				
	Research	Patient education	Staff education	Other	
If everybody used it without exceptions	Get providers "on board"	EBP literature support	Up front tell the patients that they will not be receiving any narcotics for their headache	Education for RNs and prescribers	City-wide protocol and continuity between facilities.
Consistency- all doctors order the same thing so patients don't think they can get narcotics from some doctors and not others.	MD buy-in	A protocol which is evidence-based.	Pt education. Large percentage of the patient population believes that opioid pain medications are the most effective/only med that will help them and are unwilling to consider alternatives.	Educate all staff so that they may educate patients on the reasoning and efficacy of new evidence-based practice to eliminate push back from patients not receiving narcotics.	Decrease the use of narcotics in general in the entire department as they are much over-used and it gets ridiculous when we prescribe narcotics for the most minimal paronychia...seriously! It's like narcotics are a door prize for patients for entering our department! Welcome to ... here's a script for Norco for your trip home and don't forget to give us excellent marks on our Press Ganey survey!
Providers who will be firm about not ordering opioids when it's unnecessary.	Everyone on board	Adequate research	Patients being made aware that this is the protocol and there will be no deviation from it Improved patient education	Awareness by both clinicians, other staff, & Patients.	Nothing. Recommendations are out there that just do not work in real time. In a perfect world with all the time necessary to try each escalating level of treatment a protocol would work. The bigger picture just does not allow extended trial and error treatment patterns.
All providers adhering to the suggestions regularly	Get the doctors on board!		Specific teaching for patients re: migraine management.	Nurse awareness of such protocol	Not using narcotics to boost patient satisfaction.

Table 4. Pre-Educational Survey: What would need to change or be improved upon to increase the likelihood of successful implementation?, Continued

Protocol adherence/compliance	Buy-in from providers and management	Research	Patient education	Staff education	Other
It hinges entirely on Provider compliance with the protocol. They comply and there is no question.	Understanding from management when pts are unhappy because they didn't receive narcotics		Patient education that these medication combinations although non-narcotic, are often more effective	Provider education	I think our doctors are good at trying alternatives
Getting the providers to do the orders			Patient education	Nursing needs to become comfortable with ketamine administration	
It starts with the doctors, they have to order, or be open to. I know there are others who would not do it			True migraines are usually easily treated with non-opioids. Chronic headaches and drug seekers are a lot of our population	Educate our providers as most of them practice in an outdated and not evidence-based manner.	
The MDs need to agree on this implementation plan as they are the ones to order medications.			A scripted response to narcotic seeking patients.	Education for staff and MDs	
Drs' views on narcotic use in the ED and sticking to the guidelines.					
Compliance with all ED providers. A written visible protocol that ALL providers used consistently.					

Table 5. Post-Educational Survey: What would need to change or be improved upon to increase the likelihood of successful implementation?

Protocol adherence/compliance	Buy-in from providers and management	Patient education	Staff Education	Other
Provider compliance is the only factor	Strong staff and admin support to handle patient complaints which will occur.	Education, Patience as the alternative takes patients more time and education and often confrontational encounters as they are used to certain approach and are not getting what they are used to.	Staff education about the protocol	Information to PMD offices that this will be our treatment mode
Same as above: the protocol first of all, training and consistency among care providers	Discussion with the prescribing MDs.	I think a barrier is the expectation by patients that they will leave the ER in a pain-free state.	Training for RNs & providers and provider support and consistency	
Prescriber awareness and willingness to listen to staff suggesting alternates.	Sell it as a guideline to be used at physician discretion	Lots and lots of patient education!!!	Educating the doctors and getting them to implement guidelines like this would be the biggest barrier	
Drs following the protocol., they just do what they want	Get everyone on board	An explanation to the patients in the form of posted notices and in the discharge instructions that opioids will not be used in the treatment of migraines.		
All of the providers would need to agree to the protocol and stick to it. It is difficult when one patient will be refused opioids in the ED Just to return later to have another provider give them an opioid.				
Protocol that is strictly adhered to by physicians				

CHAPTER SIX

DISCUSSION

Increased Opioid Knowledge

A thorough review of the literature, as noted in previously referenced studies by Kamarudin et al., (2013), Ganem et al., (2015), and Tournebize et al., (2016), showed how education was identified as the most important facilitator when wanting to positively impact provider prescribing habits. Post-survey results from this project showed an overall improvement in both provider and nursing knowledge regarding the opioid epidemic after an educational intervention (Figures 4, 6, 12, and 14), as well as an improved understanding of alternative medications commonly utilized to treat patients with migraine in the ED (Figure 16). The improved results identified from the post-educational survey showed the positive impact education had on improving provider and nursing knowledge in this ED environment.

Reduction of Perceived Barriers

This project was designed to help determine perceived barriers both providers and nursing staff had toward the implementation of an opioid-alternative protocol for treating patients with migraine in the ED through the use of surveys, and then utilized an educational intervention to reduce those identified barriers. The surveys designed for this project helped to identify three main types of barriers toward implementing an opioid-alternative protocol for treating patients with migraine in the ED. The barriers were

grouped into provider issues, protocol issues, and patient issues. The educational intervention was beneficial in reducing many of those perceived barriers, as seen by the trend of decreasing provider issues and an increase in patient issues (Table 3). The educational intervention was instrumental in the reduction of six of the identified barriers as shown by an increase in the percentage of respondents who disagreed with the statements shown in Figures 19-24 in the post-survey. A need for patient education was the barrier most often noted by providers, as identified from open-ended responses in the surveys (Table 3). This need was supported by similar findings from Kilaru et al. (2014), which showed a potential facilitator for the adoption of a protocol and the adherence to it would likely be improved by incorporating communication strategies around conversations with patients into the educational intervention.

Facilitators of an Opioid-alternative Protocol

Van Lange et al. (2012) discussed how people are more likely to perform an intended behavior once they have all the necessary information and skills to perform it, and once they have overcome any barriers that could interfere with their performance. The educational intervention designed for this project helped respondents overcome many barriers related to knowledge as evidenced by an increased number of respondents choosing alternative medications earlier and opioids later in the given sequence provided in Question 8 on the post-survey (Appendix A). Question 13 from the post-educational survey showed a decrease in the percentage of respondents who were “not at all likely” to

utilize an opioid-alternative protocol in the ED from 5% to zero, showing an increased likelihood of utilizing the protocol in their practice.

The educational intervention designed for this project was meant to provide all the necessary information and skills both providers and nurses needed to perform the intended behavior, which ultimately was to facilitate support for the implementation of an opioid-alternative protocol to treat patients with migraine in the ED. While this protocol was not universally supported following the educational intervention, an opioid-alternative protocol for treating migraine in the ED has generated high levels of interest, as evidenced by positive comments from over one-third of the nursing staff and personal communication from the management directly to the student investigator, and as evidenced by personal implementation of the protocol by the ED director himself when treating patients with migraine in the ED. This support by nursing staff, management, and the medical director may facilitate future universal implementation of the protocol based on the concept of TPB and the following statement by Icek Ajzen where “Generally speaking, people intend to perform a behavior when they evaluate it positively and when they believe important others think they should perform it” (Ajzen, 1985, p. 12). There were several limitations identified during this project, which are discussed below. Hopefully, these limitations can serve as stepping stones for future projects.

Limitations

A survey specifically designed for assessing the educational intervention proposed for this project was generated by the student investigator and was not validated.

In retrospect, the language used in the wording of certain questions was potentially confusing and possibly led to some questions being misunderstood. In addition, the methods used to obtain the survey pre- and post-intervention did not allow for the investigator to analyze changes in an individual's score before and after the intervention.

The number of participants for this project was small as the sample size was limited to providers and nursing staff in one department within a community-based hospital. There was also no method available to track the number of participants who actually watched the educational intervention prior to completing the post-survey. While a live classroom presentation was initially planned for all providers and nursing staff, this was not feasible due to time and budget constraints. As education and participation in the survey was not mandated, post-survey participation noticeably decreased.

A surprising limitation, not anticipated in the planning of this project, was the possible impact of the image of the investigator as a bedside nurse, rather than as a graduate nurse practitioner student. Providers may have perceived the educational intervention regarding the management of a medical condition as being designed and delivered by a nurse and outside of the nurse's scope of practice. This was an area of potential bias and something to consider in future research and educational interventions.

Providers were also introduced to the migraine protocol prematurely by the medical director of the ED and some independently utilized the protocol to some degree prior to the implementation of the project. Some of these providers reported less than satisfactory results after using the protocol, although it is not known how closely the protocol was followed.

Unforeseen technical complications occurred with the educational intervention via the Mediasite server and, as a result, many participants could not view the intended presentation. Hard copies of the PowerPoint were made available at all nursing stations and break rooms, as well as providers' mail boxes, to ensure all information from the educational intervention was received.

Despite the aforementioned limitations, there were many important lessons learned that can provide a strong foundation for future projects focused on improving provider and nursing knowledge, reducing barriers to the implementation of opioid-alternative protocols, and in facilitating the implementation of opioid alternative protocols in a hospital (ED) environment.

Implications for Future Projects

Obtaining key stakeholder support for opioid-alternative guidelines for treatment, as well as for continued education, is essential. A face-to-face educational intervention, allowing for feedback and discussion, rather than PowerPoint or handouts is also recommended for improved results. The success of St. Joseph's ALTO program in New Jersey did not occur overnight with one educational intervention; instead, Dr. LaPietra, the head of the ALTO program, mentioned it required four to five months of intensive training in their ED to educate all 60 attending physicians, NPs, and PAs, as well as over 100 nurses (Brooks, 2016).

Patient education and recommendations for communicating with patients was not addressed in the educational intervention for this project, but the need for it was

strengthened by comments from providers and nurses, as well as by supporting literature. The ALTO program in New Jersey addresses this issue by providing psychosocial support and education to the patients. Patient education is a high-priority, and should involve explanations regarding available opioid-alternatives, as well as explanations regarding the risks of opioids and when they should be considered for use (Brooks, 2016).

Time-to-implement the proposed protocol remained an overwhelming barrier for providers to accept and implement an opioid-alternative protocol to treat migraine in this particular PNWH ED. However, time is not as important as improved care and improved patient outcomes, and this should be stressed in future studies. Dr. LaPietra believes extra time spent with the patient is “a good investment. It is what medicine is about: involving the patient, caring for the patient, and taking some time with the patient” (Brooks, 2016, p. 63). Incorporating patient communication strategies and patient education into an educational intervention could help ensure patient support of the proposed pain management protocol, as well as improve the likelihood of acceptance of opioid-alternative protocols by both providers and nursing staff.

Suggestions for future projects would be to evaluate time constraints of protocol implementation and would include: actual protocol implementation to evaluate door-to-discharge times for patients presenting with migraines before protocol implementation and after protocol implementation; patient measures of pain relief at discharge prior to and after protocol implementation; evaluation of patients returning to the ED within

seven days of their initial treatment for migraine before and after protocol; and numbers of opioids prescribed in the ED, as well as at discharge, before and after implementation.

Conclusion

Improving the opioid-prescribing practices of prescribers has been noted throughout the literature as a primary method to help fight the current opioid epidemic. “Only by changing how opioids are prescribed can the toll of addiction and death from these drugs be reduced” (Juurlink et al., 2013, p. 800).

Overall, this provided promising results at improving prescribing practices by showing how a specific, educational intervention can improve opioid knowledge among providers (MDs, NPs, PAs) and nursing staff, reduce perceived barriers toward the implementation of opioid-alternative protocols in the ED, and help to facilitate the implementation of an opioid-alternative protocol for migraine in the ED.

Although the ED is responsible for a small percentage of the total opioid prescriptions in the U.S., there has been substantive research showing how opioid dependence and chronic opioid use can occur following one acute visit to the ED (Barnett et al., 2017; Hoppe et al., 2012; & Mattson et al., 2016). Due to the wide variability in ED provider opioid-prescribing practices found both in the literature and through personal observations of this student investigator, it is suggested that opioid-alternative protocols for managing acute pain and acute exacerbations of chronic pain be implemented in the ED based on the successful ALTO program at St. Joseph’s Regional Medical Center in New Jersey, as well as other facilities across the United States. The

implementation of such protocols can help standardize care amongst all ED providers, improve patient care, and reduce opioid use and misuse in our community.

As evidenced by results of this project, it is imperative to identify any perceived barriers to protocol implementation, and to reduce those barriers by providing appropriate provider, nursing staff, and patient education prior to protocol implementation.

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APPENDICES

APPENDIX A

INDIVIDUAL DATA RESULTS FROM QUESTION 8. PRE-EDUCATIONAL
SURVEY AND POST-EDUCATIONAL SURVEY RESULTS

Q8 Assign a number to the following medications in the sequence you typically order or administer the following medications when treating patients with a migraine in the ED. For example, the medication first given would be a "1". If medications are given together, assign them the same number (e.g., if Reglan and Benadryl are given first, both are marked #1). If you have never ordered or administered one of the following medications for a patient with a migraine, please mark N/A.

Answered: 40 Skipped: 0

	1	2	3	4	5	6	7	8	N/A	Total	Weighted Average
Reglan (metoclopramide)	75.00% 30	15.00% 6	2.50% 1	2.50% 1	5.00% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	40	1.48
Codeine	0.00% 0	6.06% 2	0.00% 0	3.03% 1	3.03% 1	3.03% 1	6.06% 2	6.06% 2	72.73% 24	33	5.44
Valium (diazepam)	0.00% 0	0.00% 0	15.15% 5	6.06% 2	6.06% 2	0.00% 0	9.09% 3	24.24% 8	39.39% 13	33	5.90
Tylenol (acetaminophen)	21.62% 8	18.92% 7	8.11% 3	8.11% 3	8.11% 3	5.41% 2	5.41% 2	2.70% 1	21.62% 8	37	3.17
Benadryl (diphenhydramine)	71.79% 28	20.51% 8	5.13% 2	2.56% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	39	1.38
Toradol (ketorolac)	57.50% 23	25.00% 10	7.50% 3	7.50% 3	0.00% 0	0.00% 0	0.00% 0	2.50% 1	0.00% 0	40	1.80
Dihydroergotamine (DHE)	3.03% 1	21.21% 7	12.12% 4	3.03% 1	6.06% 2	3.03% 1	0.00% 0	9.09% 3	42.42% 14	33	3.74
Magnesium	0.00% 0	2.86% 1	0.00% 0	11.43% 4	0.00% 0	2.86% 1	5.71% 2	5.71% 2	71.43% 25	35	5.40
Dilaudid	13.16% 5	39.47% 15	13.16% 5	2.63% 1	10.53% 4	5.26% 2	5.26% 2	2.63% 1	7.89% 3	38	3.09
Imitrex (sumatriptan)	11.76% 4	20.59% 7	11.76% 4	14.71% 5	8.82% 3	2.94% 1	0.00% 0	5.88% 2	23.53% 8	34	3.35
Morphine	2.94% 1	29.41% 10	14.71% 5	11.76% 4	11.76% 4	2.94% 1	5.88% 2	2.94% 1	17.65% 6	34	3.57
Intravenous (IV) fluids	84.62% 33	5.13% 2	5.13% 2	2.56% 1	0.00% 0	2.56% 1	0.00% 0	0.00% 0	0.00% 0	39	1.36
Depakote (Valproic acid)	0.00% 0	2.86% 1	2.86% 1	2.86% 1	5.71% 2	5.71% 2	5.71% 2	2.86% 1	71.43% 25	35	5.30
Haldol (haloperidol)	0.00% 0	8.33% 3	27.78% 10	5.56% 2	5.56% 2	5.56% 2	11.11% 4	13.89% 5	22.22% 8	36	4.79
Dexamethasone or other glucocorticoid	26.32% 10	18.42% 7	21.05% 8	5.26% 2	7.89% 3	2.63% 1	0.00% 0	2.63% 1	15.79% 6	38	2.66

Q8 Assign a number to the following medications in the sequence you typically order or administer the following medications when treating patients with a migraine in the ED. For example, the medication first given would be a "1". If medications are given together, assign them the same number (e.g., if Reglan and Benadryl are given first, both are marked #1). If you have never ordered or administered one of the following medications for a patient with a migraine, please mark N/A.

Answered: 23 Skipped: 0

	1	2	3	4	5	6	7	8	N/A	Total	Weighted Average
Reglan (metoclopramide)	95.45% 21	4.55% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	22	1.05
Codeine	0.00% 0	0.00% 0	5.00% 1	0.00% 0	5.00% 1	0.00% 0	0.00% 0	20.00% 4	70.00% 14	20	6.67
Valium (diazepam)	5.56% 1	5.56% 1	16.67% 3	5.56% 1	0.00% 0	0.00% 0	5.56% 1	5.56% 1	55.56% 10	18	3.88
Tylenol (acetaminophen)	30.00% 6	15.00% 3	15.00% 3	5.00% 1	5.00% 1	0.00% 0	5.00% 1	5.00% 1	20.00% 4	20	2.81
Benadryl (diphenhydramine)	77.27% 17	18.18% 4	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	4.55% 1	22	1.19
Toradol (ketorolac)	86.96% 20	4.35% 1	8.70% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	23	1.22
Dihydroergotamine (DHE)	15.00% 3	15.00% 3	10.00% 2	5.00% 1	20.00% 4	5.00% 1	5.00% 1	5.00% 1	20.00% 4	20	3.75
Magnesium	4.76% 1	9.52% 2	4.76% 1	4.76% 1	14.29% 3	4.76% 1	4.76% 1	4.76% 1	47.62% 10	21	4.36
Dilaudid	20.00% 4	25.00% 5	25.00% 5	10.00% 2	5.00% 1	0.00% 0	0.00% 0	10.00% 2	5.00% 1	20	3.05
Imitrex (sumatriptan)	15.00% 3	10.00% 2	15.00% 3	15.00% 3	20.00% 4	10.00% 2	0.00% 0	5.00% 1	10.00% 2	20	3.78
Morphine	9.52% 2	9.52% 2	14.29% 3	23.81% 5	4.76% 1	9.52% 2	4.76% 1	9.52% 2	14.29% 3	21	4.17
Intravenous (IV) fluids	77.27% 17	13.64% 3	0.00% 0	0.00% 0	4.55% 1	4.55% 1	0.00% 0	0.00% 0	0.00% 0	22	1.55
Depakote (Valproic acid)	5.00% 1	5.00% 1	0.00% 0	10.00% 2	15.00% 3	5.00% 1	10.00% 2	5.00% 1	45.00% 9	20	4.91
Haldol (haloperidol)	9.09% 2	13.64% 3	13.64% 3	9.09% 2	13.64% 3	4.55% 1	4.55% 1	18.18% 4	13.64% 3	22	4.47
Dexamethasone or other glucocorticoid	27.27% 6	22.73% 5	18.18% 4	13.64% 3	13.64% 3	0.00% 0	0.00% 0	4.55% 1	0.00% 0	22	2.86

APPENDIX B

INDIVIDUAL RESPONDENT EXPLANATIONS TO QUESTION 14:

“THIS WILL BE BURDENSOME ON MY TIME.”

“Protocols for headaches in the emergency department are too time-consuming and in my experience have a high rate of failure and ultimately require narcotic rescue. I do not believe that parental narcotic administration for migraines leads to opioid addiction. I generally do not prescribe narcotics for home use for headaches.”

“Pts are in the ED a long time if you follow the protocol.”

“Rarely is there enough time to trial one tactic after another in serial fashion until a level of relief is achieved. The most important patient factor is that each has an individual history, presentation, and medication constraints such that a cookie cutter template will not work.”

“I think that going through the protocol will take more of my and nursing time as well as the cost of giving multiple medications. The other is overcoming patient's expectations that they will receive narcotics for their headaches.”

“Migraines are a patient problem that is typically relatively easy to "treat and street." With the protocol I can see this resulting in a greater time in the ER and more labor intensive for the nurses.”

“I worry that a protocol with multiple steps will prolong ED stays, also there is a subset of migraine patients that have come to expect narcotics and don't want to try anything new.”

“Migraines are one of those complaints where a quick treatment and disposition is good for the doctor and the patient. Protocols that keep the patient in the ED for hours, taking up a bed that could be better utilized for sicker patients is not efficient. I'm all for non-narcotic treatment but there should be some time sensitivity involved.”

“Patient with typical migraine, no atypical features and no concerning findings on history or physical examination would obviously benefit from opioid-alternative protocol. However, even small changes in their presentation can herald disease states which can represent life threatening disease. In the emergency department we wind up treating a lot of people with migraines but our real job is to sort out the migraine patient from someone who has an emergent medical condition. This can be difficult and time consuming. Patients are dynamic living creatures with incredibly complex physiology. They are not like an airplane or automobile. Patients also commonly don't understand what a migraine is and say they have the when they really don't. When evaluating a patient 2+2 does not always equal 4. When you look at studies you are describing populations not individuals. When you are practicing medicine you are treating an individual not a population. When someone presents to the emergency department with a headache (even in a patient who has a diagnosis of migraine) the provider has to decide if an emergency medical condition exists. Some migraine mimics could include carbon monoxide poisoning, meningitis, intracranial hypertension, intracranial hypotension, subarachnoid hemorrhage, tumor,

vasculitis. I have personally had migraine patients who turned out to have serious underlying causes for their headaches. You can give toradol and Reglan all day long to someone with viral meningitis and they will likely not notice any improvement in their pain. So when we are talking about protocol driven pain control it is based on the assumption that we know what the diagnosis is at the time we administer pain medication. The workup for concerning headache can take hours sometimes and there are many contraindications to recommended first line treatments. This could lead to providers being unwilling to follow this type of treatment protocol until after they are convinced of the diagnosis.”

“Time to admin meds and evaluate each individually before going to opiates would extend treatment times.”

APPENDIX C

INDIVIDUAL RESPONDENT EXPLANATIONS TO QUESTION 14: “THERE
ARE PATIENT FACTORS THAT MAKE THIS UNREALISTIC.”

“There are many patients who are not open to conversation about why you don't want to use the medication (usu Dilaudid) that they have come to know is "the only thing" that will help them. They particularly don't want to talk about it when they are miserable. Our pattern of inconsistency as a group on avoiding narcotics does not help.”

“I think we would still need some kind of approach to deal with chronic opioid users who challenge the protocol, or say "ibuprofen and Tylenol don't work for me, or request a different doctor, threaten staff with violence or retribution if they are not given what they want, or report on the Press Ganey that their pain was not adequately managed in a timely way, and consequently implying that the nurses and the doctors did not show care and respect.”

“I am not a provider I do not order medications. However, some patients do come in for migraine treatment that have done all their home treatments with no relief and are ONLY looking for Dilaudid or another type of narcotic/opiate for relief and are very upset if they do not get it.”

“I see a lot of M.D.'s who are quick to pacify a patient who wants opiates. It usually just takes some complaining and they tend to cave. In general, the providers want to turn over these patients as quickly as possible.”

“Some patients that believe only narcotic medications will help their pain.”

“Re. Patient factors, I'm sure that a lot of the non-narcotics would start showing up on allergy lists.”

“Patient desire for narcotics.”

“We are part of the problem. We need to decrease the distribution in the ED.”

“My experience with most migraine patients is that they report allergies to ‘all NSAIDS,’ ‘Tylenol doesn't work for me,’ ‘the only thing that works is Dilaudid and they usually have to give me 3 doses and 2 bags of IV fluids.’ I have had a few patients that will get relief with the Benadryl, dexamethasone, Reglan protocol, but it takes a lot of coaching and convincing on my part to get them to even try it. Our doctors are moving away from opioids to treat migraines; however we have not been introduced to an alternative protocol.”

“Some patients have ‘Migraines’ that have other underlying origins and these protocols will not be effective. However, these are outliers and should not impact the overall change.”

“Some providers will treat with non-narcotics-the pt. will continue to c/o pain. MD will provide one dose of narcotic-pt. will be satisfied then discharge. Other providers will

refuse narcotics, the patient will leave mad. This same patient will come back and receive narcotics from another provider several days later.”

“Some patients will be very unpleasant and will stop at nothing to have opiates ordered. No amount of alternative will stop the people who only want opiates.”

APPENDIX D

EVIDENCE TABLE

Evidence Table – Polit and Beck Evidence Hierarchy (2012)

Author Year	Study Type Level of Evidence	Population Studied	Intervention Method	Key information	Outcomes
AMDG, 2015	Guideline LOE I	Washington State	Interagency Guideline on Prescribing Opioids for Pain	Updated October 2015 -Updates include all pain phases instead of focusing on chronic pain as original 2007 guidelines did -Recommends non-opioid options for pain management	-After implementation of the original 2007 guideline resulted in a 29% decrease in opioid-related deaths between 2008 and 2013 -Patients who used opioids for at least 90 days were greater than 60% more likely to still be on chronic opioids in 5 years. -For most pain conditions, non-opioid analgesics (e.g. acetaminophen and NSAIDs) and adjuvant analgesics (e.g. antidepressants and anticonvulsants) are equally or more effective with less risk for harm than opioids.
Bajwa & Smith 2017	Systematic review of RCTs LOE I	Patients with migraine	Medication recommendations for the acute treatment of migraine in adults graded A through E	Patients treated with opioids as first-line therapy were significantly more likely to return to the ED with a headache within seven days of the original visit	recommended migraine-specific agents such as DHE and triptans as first-line agents for treating migraine, and even more effective is using the combination of a triptan and a NSAID
88Barnett et al. 2017	Observational study LOE IV	ED prescribers and opioid naïve patients in Medicare part D	Attribution method of opioid prescribing of low-intensity prescribers and high-intensity prescribers	215,678 patients treated by low-intensity prescriber 161,951 treated by high intensity prescriber Rates varied by a factor of 3.3 within the same hospital. Long-term opioid use at 12 months was significantly higher among patients treated by high-level prescribers vs. low-intensity (1.51% vs 1.16%)	Long-term opioid use = 180 days or more of opioids supplied in 12 months after ED visit Rates of hospital encounters to determine adverse effects and undertreatment of pain Large variability in opioid prescribing patterns between prescribers These results suggest that an increased likelihood of receiving an opioid for even one encounter could drive clinically significant future long-term opioid use and potentially increased adverse outcomes among the elderly.
Beaudoin et al. 2017	SR LOE I	ED providers	Performed an interrupted time-series analysis of data from 3 different hospitals before and after implementation of an ED opioid-prescribing policy	Showed declines in opioid prescribing at all three hospitals (decreased 8.5% at hospital 1, 1.3% at hospital 2, and 5.7% at hospital 3)	The largest reduction in opioid-prescribing occurred with PAs and NPs (10.7%) as well as physicians who had medium (down 7.6%) and high (down 5.1%) levels of pre-policy opioid prescribing (Beaudoin et al., 2017). Results from their study showed how an ED-based policy may be effective in reducing opioid-prescribing particularly by impacting providers with high baseline prescribing practices
Bonnie, Ford & Phillips 2017	Consensus study report LOE VII	Prescribers	Addressed strategies for influencing prescribing practices	Recommendations for state medical and other health professional schools to coordinate with state licensing boards, The NIH pain consortium, USDA, The CDC and the DEA to develop and	Solely recommendations for improving provider prescribing habits

				evidence-based national approach to pain education	
CDC, 2016a	Press Release LOE VII	Chronic pain patients	National guideline for primary caregivers for prescribing opioids for chronic pain	Aims to improve safety of prescribing and curtail harms associated with opioid use -focuses on increasing the use of other effective treatments available for chronic pain	Non-opioid therapy is preferred for chronic pain outside of active cancer, palliative, and end-of-life care.
CDC, 2016b	Guideline Resources LOE I	Non-opioid treatments for chronic pain	Guideline resource	Patients with pain should receive treatment that provides the greatest benefit. -opioids are not the first-line therapy for chronic non-cancer pain	-use non-opioid therapies to the extent possible -focus on functional goals and improvement -use disease-specific treatments when available -specifies recommended treatments for low back pain, migraine, osteoarthritis, and fibromyalgia
CDC, 2016c	Guideline Resource LOE I	Assessing benefits and harms of opioid therapy	Guidance for opioid prescribing Assess benefits of opioid therapy Assess harms of opioid therapy	US is in the midst of an epidemic of prescription opioid overdose deaths, which killed more than 14,000 people in 2014 alone	Improving the way opioids are prescribed can ensure patients have access to safer, more effective chronic pain treatment while reducing the number of people who misuse, abuse, or overdose from these drugs
Cohen et al. 2016	Single nonrandomized trial LOE II	All adults arriving at the ED with a pain complaint over an 8 hour time period	Opioid-sparing protocol based on CERTA-Channel enzyme receptor-targeted analgesia	Rationale was to evaluate feasibility of controlling acute painful conditions without oral and parenteral opioid analgesics	17 patients treated for acute or chronic pain were managed mainly with iv ketorolac and oral ibuprofen, with only 1 patient requiring rescue opioid therapy -83% of patients were satisfied with pain relief
Chou et al., 2015	SR of RCTs LOE I	Adults with chronic pain	Long term opioid therapy vs placebo, no opioid, or non-opioid therapy	Supports education of providers on the risks of opioid therapy More harm than good	Compared with no opioid use, opioid therapy for chronic pain is associated with increased risk for overdose, opioid abuse and dependence, fractures, and MI
Donaldson et al. 2017	Single Correlational study LOE IV	ED prescribers receiving a 5 minute intervention Random providers surveyed Random patients surveyed	Evaluate the impact of a brief one-on-one educational intervention on ED discharge opioid prescribing	The intervention improved the quality of opioid analgesic prescribing in this setting from both provider and patient perspectives	Patients in the post-intervention study reported using pain therapies other than oxycodone in the post-intervention group 85% than pre-intervention 49%, and the percentage of patients using simple analgesia increased from 28% to 70% after the intervention. All 30 prescribers who received the educational intervention agreed or strongly agreed that their opioid prescribing practices would change as a result of the intervention
Franklin et al., 2015	Article LOE VII	n/a	A comprehensive approach to address the prescription opioid epidemic in Washington State	in 2006 a consortium of all Washington agencies that purchase or regulate health care (the Agency Medical Directors' Group [AMDG]) collaborated with 15 Washington pain management experts (the Clinical Advisory Group) to develop an opioid pre- scribing guideline. WA is 1 of 49 states with an operational prescription drug monitoring program (PDMP)	Emergency department provider enrollment with PDMP is 1 of Medicaid's 7 ED best practices, however it is not mandated -opioid prescribing increased 500% from 1997 to 2006 in WA

Frei 2015	Non-randomized trial LOE II	Patients presenting to ED with diagnosis of primary migraine or recurrent headaches that aren't migraine	Appropriate patients were treated with the step therapy	The algorithm calls for no opiates to be prescribed at discharge. Those who had responded to ketorolac are discharged with a ketorolac prescription of 10 mg four times daily for five days, whereas those who responded to sumatriptan receive a prescription for that medication. Responders to DHE are discharged with a migraine nasal spray prescription or a subcutaneous DHE prescription, and those responsive to valproate are prescribed a valproate taper of 250 mg three times daily for three days, 250 mg twice daily for three days, 250 mg once daily for three days and then cessation. Follow-up with the primary care provider is also scheduled.	-comparing pre-algorithm implementation (50 patients from October to December 2012) with post-algorithm implementation (44 patients from January to April 2013 and 50 patients from January to August 2014), there was a striking drop from 66% use of narcotics or opioids in the ED to 12% in 2013 and 24% in 2014. -the rate of patients discharged with prescriptions for narcotics or opiates fell from 44% before the protocol to 8% (four patients) in the first period after the protocol and 6% (three patients) in the second period after the protocol. The rate of more than 50% pain relief remained constant, at 63% before and after implementation.
Friedman et al. 2015	Retrospective probability study LOE III	Randomly selected EDs, and all patients with ICD-9 code for migraine as discharge diagnosis	Tabulated frequency of use of specific medications in 2010 and compared results with data from 1998. Used a logistic regression model of the multi-stage probability sample	Despite practice guidelines recommending non-opioid treatment as first-line therapy for migraines, overuse of opioid medications as treatment continued for acute headache treatment in hospital EDs across the U.S.	Opioids were administered in 59% of the 1.2 million migraine visits to EDs Most commonly used medication was hydromorphone used in 25% of visits Use of any triptan was relatively uncommon in 2010 Also found opioid use in migraine visits is independently associated with prior visits to the same ED in previous 12 months
Ganem et al. 2015	Retrospective study LOE II	EDs at 2 military hospitals	Comparison of providers, types of narcotics, numbers in prescription	Hypothesized that active duty providers prescribe less due to participation in additional educational efforts. -annual health-care education regarding chronic pain --effort within the military to limit opioid prescriptions	-Civilian providers were more likely to prescribe an opioid than active duty -PAs more likely to prescribe opioids than physicians
Garg et al., 2013	Comparison study Interrupted time series analysis LOE III	161,283 workers in WA WC aged 18-64 with accepted DLI claim and at least 1 opioid prescription dispensed between April 2004 and Dec 31, 2010	Looked at comparison of numbers of opioid prescriptions and users pre- and post- guideline implementation Interagency Guideline on Opioid Dosing for Chronic Non-Cancer Pain (2007)	In 2008 WA had an opioid-related mortality that was 50% higher (7.4 per 100,000) than the national average (4.8 per 100,000)	Mean monthly prevalence of opioid use declined by 25.6% between 2004 and 2010. Chronic and high-dose opioid use rates declined after guideline implementation...support evidence that risk management strategies may help to stop the opioid epidemic.
Gelfand & Goadsby 2012	Review of evidence LOE III	106 listed references supporting specific treatments for migraine in the ED	Listed potential treatments for acute migraine in the ED setting	An ED visit for migraine represents a failure of appropriate outpatient management. -opioids are not as effective in the treatment of acute migraine as other agents, such as DHE and ketorolac -opioids may also render triptans, less effective -opioids have the potential to promote chronic migraine and medication overuse migraine, as	Migraine can become more difficult to treat the longer it lasts Migraine attacks become more severe with time Opioids should never be considered as first-line agents when treating migraine

				well as need for return to the ED	
Hoppe, Kim, & Heard, 2015	Retrospective Cohort Study LOE III	All patients discharged from ED with an acute painful condition in urban academic ED	Compared opioid naïve patients with non-naïve patients	ED prescribing may be a gateway to recurrent opioid abuse 17% of patients filling Rx for a minor painful condition still received opioids 1 year after initial ED visit	Opioid naïve ED patients prescribed opioids for acute pain are at increased risk for additional opioid use at 1 year Pain and suffering are possibly viewed as a threat for therapeutic success making ED, thus ED providers may actually over-treat pain
Kamarudin, et al., 2013	SR of 47 studies 20 RCTs, 15 non-RCTs and 12 before-after studies LOE I	Prescribers in primary and secondary care	Evaluated education-based interventions to aid improvement in prescribing competency	WHO <i>Guide to Good Prescribing</i> increased prescribing competency in a number of settings Promotion of rational medication use based on published practice guidelines in face-to-face interactions positively impacted health professional behavior	Positive results were reported following multi-faceted interventions where education was incorporated into a system-based approach to influence prescribing behavior Specific education on prescribing led to improved prescribing competency. Consider incorporating a prescribing component (protocol) into a structured curriculum.
Kilaru 2014	Semi-structured qualitative interviews LOE VI	Convenience sample of 61 emergency physicians attending the ACEP Scientific Assembly (Oct, 2012, Denver, CO)	Open-ended semi structured interviews	-Several participants had limited awareness of opioid-prescribing guideline content -Hypothesis arose... local guidelines more effective than state or national?	-Physicians commonly endorse guidelines as communication tools and justification of decisions -A potential facilitator for guideline adoption may be to incorporate communication strategies or framing recommendations around conversations with patients
LaPietra et al. 2016	Report based on Evidence-based reviews in ED care LOE VII	Acute Pain management in the ED	Review of pharmacology for alternative medications used to treat	Channels/enzymes/receptors targeted analgesia or CERTA focuses on patient-specific, pain syndrome-targeted analgesia in the ED Synergistic combinations of different classes of analgesics acting on different target sites will result in greater analgesia and reduced doses of each individual medication that may lead to fewer side effects and shorter length of stay.	Multimodal is defined as using a combination of pharmacologic agents to target multiple pain receptors to result in greater pain relief.

Mattson et al., 2016	Retrospective cohort study LOE III	Opioid naïve patients presenting to ED with acute pain	Patients were followed for one year following initial visit and EHR were evaluated for subsequent opioid medications, logistic regression analysis was then done to assess risk factors for episodic and long-term opioid use	Opioids prescribed for 874 (30.5%) of opioid-naïve patients. 22.5% of the opioid-naïve patients became episodic users after one year and 1.6% became long-term users.	A relatively large percentage of opioid-naïve patients treated for acute pain in the ED and discharged with an opioid prescription continued to use opioids during the following year. Patients with a history of anxiety and PTSD were at increased risk for continued opioid use, in addition to increased age and female sex. Recommendations to evaluate the above risk factors when prescribing opioids was given.
Nelson, Juurlink, & Perrone, 2015	Editorial LOE VII	Opioid epidemic	Evaluated the history of the opioid epidemic	Opioid-related harm has now reached epidemic levels: emergency department visits for nonmedical use of prescription opioids more than doubled from 2004 to 2011, accounting for an estimated 488 000 visits in 2011. Deaths have more than tripled since 1999, with an estimated 16 235 deaths attributable to prescription opioids in 2013.	n/a
Neven et al., 2012 #	Original Article LOE VII	Information regarding the development of Washington State Emergency Department Opioid Prescribing Guidelines	Background information from CDC on widespread problem and reason for creation of guidelines, creation of an opioid abuse workgroup, development of EDIE	-Discussion of feedback, questions and barriers related to the ED opioid guidelines -primary barrier is concern for reduced patient satisfaction	-Evaluations are currently underway to assess the effectiveness of the policy change
NSC, 2015	News release LOE VII	Prescribers	Press release	4.3 million current nonmedical users of painkillers and nearly 2 million people have painkiller substance use disorders	Statement to DEA to require education for opioid painkiller prescribers Propose mandatory education and training curricula should be a part of initial and subsequent registration of providers under the Controlled Substances Act of 1970
Poon & Greenwood-Erickson, 2014	SR of qualitative studies LOE V	Role of emergency medicine on the opioid epidemic	Hypothesize that a combination of policy and education reforms will result in decreased rates of opioid abuse, misuse and death.	Pain is the most common reason why patients present to the ED and is often undertreated in the ED setting Key background information on opioid epidemic and causation	Provided an opioid-prescribing curriculum sample for emergency medicine residents that would last 5 hours. Reviewing some resident program education programs showed an improvement in knowledge, comfort, and confidence in a resident's ability to manage chronic pain Found only one article in the literature describing a pain management curriculum for ED residents but was never implemented.

Skaer & Nwude 2016 #	Qualitative review article LOE VII	Discussion	Opioid prescribing laws and ED guidelines in Washington State	Episodic care settings such as the ED should refrain from supplying opioids to chronic pain patients whenever possible. <i>ER is for Emergencies</i> its the Seven Best Practices program was discussed	It is vital that practitioners comprehend the new guidelines and make appropriate adjustments in their opioid prescribing habits
Teater 2015	National Safety Council review of evidence LOE VII	Overview of the efficacy of pain medications	Review of the Cochrane collaboration	NNT = dose of pain medication with the effect being 50% pain relief; lower the NNT the more effective the medicine. NNT of 1.5 is very good and 2.5 is good Table of NNT of commonly used pain medications is provided	The combination of ibuprofen 200 mg + acetaminophen 500 mg has a NNT of 1.6, compared to oxycodone NNT of 4.6.
Tournebi ze et al., 2016	SR of guidelines LOE I	Studies evaluating adherence of practitioners with at least one form of opioid risk reduction strategy	Comparison of multiple opioid guidelines	Compare different opioid guidelines on risk reduction strategies -most physicians prescribing chronic opioid therapy do not adhere to more than half of opioid risk cautions -only 47% of physicians implement written opioid contracts prior to initiating opioid therapy	Substantial practice and knowledge gaps were identified. All guidelines recommend that opioid therapy should only be considered after all other pharmacological and non-pharmacologic attempts have failed. -found still a vast domain to improve knowledge and clinical practice of physicians in order to shift to best practices in the field of prescription of opioids to treat CNCP
Young et al. 2017 #	Cross-sectional analysis LOE V	Adult ED patients in 3 diverse EDs in Connecticut who received treatment for migraine headache	Medications separated into first-line and rescue meds Number of visits, lengths of stay, door to provider time, and total provider time were compared. A total of 1222 visits were identified.	Overall, opioids were given in 68.6% of visits in the community ED, 40.9% in the urban ED, and 12.3% in the academic center. Opioids were used as a first-line agent in 29.5% of visits on average and as a rescue agent in 49.4% of visits where additional medications were required. Opioids were given 58.2% of the time as first-line agents in the community ED, compared to 35.3% in the urban ED and 6.9% in the academic center. As a rescue medication, opioids were given 69.9% of the time at the community ED, 63.9% at the urban ED, and 20.6% at the academic center	Patients who received opioids had a 37.7% increase in visits over the 14-month study period than those not given opioids 36% who received opioids required further treatment in the form of rescue medications as compared to 25.1% in the standard therapy group “facility-based opioid-free treatment guidelines may lead to more appropriate migraine management strategies and better outcomes. 30% decrease in length of stay where opioids were not given.

ACEP = American College of Emergency Physicians; CDC = Centers for Disease Control and Prevention; CDSs = clinical decision support systems; CNCP = chronic non-cancer pain; DEA = Drug Enforcement Agency; DHE = dihydroergotamine; ED = Emergency department; EDIE = Emergency Department Information Exchange; FDA = Food and Drug Administration; LOE = Level of Evidence based on Polit & Beck (2012) evidence hierarchy; MI = Myocardial infarction; NIH = National Institutes for Health; NNT = Number needed to treat; NSAID = Non-steroidal anti-inflammatory drug; NSC = National Safety Council; PAs = Physician assistants; RCT = Randomized control trial; SR = Systematic review; WC = worker’s comp; WHO = World health organization

APPENDIX E

PRE/POST-EDUCATIONAL SURVEY



Opioid Use in the ED:

A Pre- and Post-Education Survey of ED Staff Perceptions

The following questions will help assess how much the ED staff at HFH know about opioid utilization and current treatment recommendations for migraines in the ED.

Participation in this survey is voluntary and will have no impact on your job or performance evaluations. All responses are anonymous and will be helpful in creating and evaluating future initiatives to improve patient care. By completing this survey you are consenting to take part in this study. Thank you for your time.



Opioid Use in the ED:

A Pre- and Post-Education Survey of ED Staff Perceptions

1. What is your role at Holy Family Hospital Emergency Department?

- RN
- Prescriber

2. How many years of experience do you have in your current role?

- < 2 years
- 2-5 years
- > 5 - 10 years
- >10 - 20 years
- More than 20 years

3. To what extent is opioid misuse a problem in the patient population you see/serve? (Rating scale 0-10, with 10 being the absolute worst and 0 being no problem)



4. How many people in the United States die each day from an opioid overdose?

- 5 - 15
- 20 - 30
- 45 - 50
- 75 - 80
- > 100

5. What percentage (%) of patients initially filling an opioid prescription for a minor painful condition in the emergency department are still taking opioids one year after that initial ED visit?

- 3 %
 9 %
 17 %
 26 %

6. True or False: Current national guidelines recommend treating acute pain related to migraine with opioids.

- True
 False
 I don't know

7. What is your comfort level regarding the use of intranasal or intravenous ketamine in sub-dissociative or low doses for the treatment of migraine in the emergency department? (0 = not comfortable at all, 10 = very comfortable)

A horizontal slider scale for comfort level. The scale is marked with 0, 5, and 10. A circular handle is positioned at 0, and a rectangular box is positioned at 10.

8. Assign a number to the following medications in the sequence you typically order or administer the following medications when treating patients with a migraine in the ED. For example, the medication first given would be a "1". If medications are given together, assign them the same number (e.g., if Reglan and Benadryl are given first, both are marked #1). If you have never ordered or administered one of the following medications for a patient with a migraine, please mark N/A.

	1	2	3	4	5	6	7	8	N/A
Reglan (metoclopramide)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Codeine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Valium (diazepam)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tylenol (acetaminophen)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Benadryl (diphenhydramine)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toradol (ketorolac)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dihydroergotamine (DHE)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Magnesium	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dilaudid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Imitrex (sumatriptan)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Morphine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Intravenous (IV) fluids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Depakote (Valproic acid)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Haldol (haloperidol)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dexamethasone or other glucocorticoid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ketamine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

9. True or False: When considering the drug effectiveness using the number needed to treat (NNT), the combination of acetaminophen plus ibuprofen is often more effective than opioids when treating an acute episode of migraine.

- True
- False
- I don't know

10. True or False: The combination of a triptan with an NSAID is more effective for treating migraine than either agent alone.

- True
 False
 I don't know

11. A patient with a migraine is unable to have sumatriptan but has received Reglan, 1 liter saline bolus, and toradol 30mg intravenously. Despite treatment, the patient has achieved less than 50% pain relief. Which would you consider giving next? Please assign number based on order of administration, or choose N/A if you would not order/administer.

<input type="checkbox"/>	<input type="text" value="Haldol"/>	<input type="checkbox"/> N/A
<input type="checkbox"/>	<input type="text" value="Dilaudid"/>	<input type="checkbox"/> N/A
<input type="checkbox"/>	<input type="text" value="Magnesium"/>	<input type="checkbox"/> N/A
<input type="checkbox"/>	<input type="text" value="Morphine"/>	<input type="checkbox"/> N/A
<input type="checkbox"/>	<input type="text" value="Valproic acid"/>	<input type="checkbox"/> N/A
<input type="checkbox"/>	<input type="text" value="Dexamethasone"/>	<input type="checkbox"/> N/A

12. Are you aware that opioid alternative protocols exist for utilization in the ED?

- Yes
 No

13. If an opioid alternative migraine protocol utilizing established evidence-based practice guidelines were available for you to use today at this facility, how likely would you be to use it?

- Extremely likely
 Somewhat likely
 Not at all likely

14. For each of the following statements please indicate how strongly you agree or disagree with them. If you agree to a question that asks for an explanation please do so in the comments section provided.

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
I disagree with the current national guideline recommendations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An opioid alternative protocol does not apply to the ED environment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't see a need for this change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe there is a lack of efficacy of protocols in general.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am unfamiliar with the procedure for using and administering the alternative medications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The rationale for the implementation of this protocol is vague and unclear.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This will be burdensome on my time. (Please explain).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are patient factors that make this unrealistic. (Please explain).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am concerned that reimbursement for alternative medications may be problematic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't believe there are any barriers to implementing an alternative protocol.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would support implementation of an alternative protocol.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comments related to time and/or patient factors (please specify)					

15. What would need to change or be improved upon to increase the likelihood of successful implementation of an opioid alternative protocol for the management of patients with migraine in the HFH emergency department?

THANK YOU FOR COMPLETING THIS EVALUATION!

If you have any questions, please feel free to contact me, Jennifer Carlson at (507-398-4080; jennifer.carlson3@student.montana.edu).

APPENDIX F

PRELIMINARY MIGRAINE PROTOCOL

Preliminary Migraine Protocol

Reglan 10mg PO/IV (mixed in 50cc NS over 10 minutes)—consider combining DHE 1

mg iv

BAJWA & SMITH (2016)

+

1 liter 0.9% NS bolus

GELFAND & GOADSBY (2012)

+

Motrin 600mg PO or Toradol 30mg IM/IV

BAJWA & SMITH (2016) AND GELFAND & GOADSBY (2012)

+

Tylenol 1000mg PO (try IV acetaminophen for nauseated patients)

MARMURA ET AL. (2015), DERRY, DERRY, 7 MOORE (2013, BAJWA & SMITH (2016), AND MEYERING, STRINGER,
AND HYSELL (2015)

AND/OR

Consider Sumatriptan 6mg SQ (up to 24 hours after onset of migraine)

BAJWA & SMITH (2016) AND GELFAND & GOADSBY (2012)

IF < 50% pain relief then:

Magnesium 1 gram IV (over 60 minutes)

MARMURA ET AL. (2015)

+

Valproic Acid 500mg/50cc NS (over 20 minutes)

GELFAND & GOADSBY (2012) AND MARMURA ET AL. (2015)

+

Dexamethasone 4-8mg IV

GELFAND & GOADSBY (2012) AND BAJWA & SMITH (2016)

IF < 50% pain relief then:

Haldol 5mg IV (over 10 minutes)

Gelfand & Goadsby (2012), Marmura ET AL. (2015), AND Bajwa & smith (2016)

AND/OR

Consider Ketamine 0.3mg/kg IV (over 10 minutes) - especially if chronic opioid use
HUGHES (2014), POTTER & CHOUDHURY (2014), YEAMAN ET AL. (2014), ANDERSON (2016), AND GOLDEN (2015)

-PROTOCOL ADAPTED FROM A COMBINATION OF ST. JOSEPH MEDICAL CENTER (NEW JERSEY) AND THE CLEVELAND CLINIC MIGRAINE PROTOCOLS, AS WELL AS RECOMMENDATIONS FROM THE AGENCY FOR HEALTHCARE RESEARCH AND QUALITY, HAMILTON MEDICAL GROUP, AMERICAN HEADACHE SOCIETY, UP-TO-DATE, AND THE NEW YORK CHIROPRACTOR COLLEGE

Individual Medication Information

Levels of Evidence

Study classification for therapeutic interventions from the American Academy of Neurology

- **Class I study = randomized controlled clinical trial (RCT) with 5 criteria**
- **Class ii = cohort study meeting criteria for class I or a RCT lacking 1 or 2 criteria of the above 5 criteria**
- **Class iii = controlled studies including a description of major confounding differences between treatment groups that could affect outcome.**
 - **Level A: Established as effective for acute migraine (supported by at least 2 class I studies)**
 - **Level b: Probably effective (supported by 1 class I study or 2 class ii studies)**
 - **Level c: possibly effective (supported by 1 class ii study or 2 class iii studies)**

STEP ONE

REGLAN

Has antidopaminergic effects and is a serotonin receptor 5ht3 antagonist
Level b evidence supported by class I and ii studies and the 2000 American academy of neurology evidence review show its possible effectiveness

Iv Reglan is effective for acute migraine treatment as show by systematic reviews and meta-analyses provided in up-to-date.

Nnt of metoclopramide was found to be 4 (bajwa & smith, 2016).

DHE

Does not cause physical dependence or rebound headaches

When administered with an antiemetic such as reglan it has been found to be highly effective for acute migraine as well as status migrainosus (Bajwa & smith, 2016).

IV FLUIDS

Dehydration worsens migraine and can make it harder to treat, so unless contraindicated, liberal fluid replacement is most likely helpful and unlikely to be harmful (Gelfand & Goadsby, 2012).

Fluids are used to help avoid postural hypotension associated with some medications used to treat migraine, and it can also provide renal protection if ketorolac is used (Gelfand & Goadsby, 2012).

NSAIDS

Nsaids with reported efficacy in randomized, placebo controlled trials of migraine therapy include aspirin (650 to 1000 mg), ibuprofen (400 to 1200 mg), naproxen (750 to 1250 mg), diclofenac (50 to 100 mg), and ketorolac (30 mg intravenous or 60 mg intramuscular) (Bajwa & Smith, 2016).

Nsaids are typically safe and well-tolerated and can be combined with triptans for improved efficacy and migraine relief (Gelfand & Goadsby, 2012).

TYLENOL

Oral acetaminophen was found to have a 2-hour headache relief in 57.8% of those taking 1000 mg acetaminophen vs 38.7% taking placebo (P = .002) (marmura et al., 2015).

Acetaminophen combined with ibuprofen has been show to provide optimal pain relief with a number needed to treat (nnt) of 1.6 (Derry, Derry, & Moore, 2013).

Evidence has shown that acetaminophen is an effective abortive agent, and can be effective at treating pain, functional disability, photophobia and phonophobia (Bajwa & smith, 2016).

Intravenous acetaminophen when used as an adjunct with anti-emetics to treat acute headache in the ER resulted in increased pain reduction, decreased length of stay and less rescue medication including narcotics utilized when compared to anti-emetics alone (Meyering, stringer, & Hysell, 2015).

TRIPTANS

Migraine specific treatment and act at the pathophysiologic mechanism of the headache (Bajwa & smith, 2016)

When used for headaches whose duration has not exceeded six hours, the efficacy of sumatriptan can be as high as 91%, but it's efficacy in most emergency departments is closer to 75% (Gelfand & Goadsby, 2012).

The combination of a triptan with an nsaid is more effective for migraine than either agent alone (gelfand & goadsby, 2012).

STEP TWO

MAGNESIUM

Best used for patients with migraine with aura.

Class ii study as cited by Marmura et al. (2015) showed benefit superior to placebo at 60 minutes in regards to headache relief (50% vs 13%; $P < .05$) and headache freedom (37% vs 7%; $P < .05$).

VALPROIC ACID

No placebo-controlled studies of IV sodium valproate are available, however there are four open-label studies that give some support for its efficacy (Gelfand & Goadsby, 2012).

Typical dosages range from 300 to 1200 mg in the studies with no clear dose-related pattern in improved response (Gelfand & Goadsby, 2012).

The majority of patients (63.1%) reported improvement in one class iv study, while another class iv study 32 of 36 patients reported improvement after treatment (Marmura et al., 2015)

DEXAMETHASONE (CORTICOSTEROIDS)

Dexamethasone has been shown to possibly decrease the risk of headache recurrence after ED discharge (Gelfand & Goadsby, 2012).

Level c rating based on strength of evidence from the 2000 american academy of neurology evidence review shows dosage 4-16 mg iv.

Up-to-date recommends (grade 1B) adjunctive treatment with a single dose of dexamethasone (10 to 25 mg) to reduce the risk of early headache recurrence for those patients treated for headache in the emergency department (Bajwa & smith, 2016).

STEP THREE

HALDOL

Caution should be used and an EKG should be obtained prior to use as both can cause qt prolongation and torsade de pointes (Gelfand & Goadsby, 2012).

Haloperidol was found to be effective for migraine pain relief, however 80% of patients receiving the medication had adverse effects such as sedation and akathisia (Bajwa & Smith, 2016)

KETAMINE

For pain relief ketamine is given in a sub-dissociative dose, where anesthesia doses are typically 1 to 2 mg/kg. This is not considered conscious sedation and will not require documentation in sedation flow chart.

Not currently included in St. Joseph's or Cleveland Clinic's migraine protocols, but has been shown by studies to have great effect as a multipurpose analgesic

The United States Headache Consortium recommended treatment of migraine includes ketamine (Hughes, 2014).

Analgesic efficacy in nociceptive and neuropathic pain is evident (Potter & Choudhury, 2014).

Has been found to have anti-inflammatory properties as well.

Can manage opioid withdrawal, help with chronic regional pain syndrome and depression as well, which are common with migraine.

Intranasal ketamine (1mg/kg) was moderately effective in providing pain relief to adult patients presenting to the ED with severe pain from various presentations (Yeaman et al., 2014).

Ketamine helps quiet the hyper-excitability that can come with chronic migraine and chronic pain (Anderson, 2016).

247 participants in an open outpatient study with migraine received iv ketamine infusions and all groups reported at least a 50% reduction in their headache (Golden, 2015).