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# Effect on Opioid Use following the Implementation of Evidence-Based Pain Management

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# Effect on Opioid Use following the Implementation of Evidence-Based Pain Management Practices for an Observation Unit

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## Table of Contents

**DNP Project Plan ..... 3**

a. Abstract ..... 4

b. Introduction and Background ..... 5

c. Current Practices ..... 9

d. Problem Statement ..... 12

e. Evidence-based Initiative ..... 12

f. Conceptual Models ..... 16

g. Feasibility Assessment of the Organization ..... 20

h. Project Plan ..... 23

i. Implications for Practice ..... 39

j. Plans for Dissemination ..... 39

k. References ..... 40

l. Appendices ..... 49

**DNP Project Results ..... 73**

a. Abstract ..... 74

b. Manuscript ..... 75

c. Figures ..... 86

d. Tables ..... 91

e. References ..... 96

**DNP Project Oral Defense Presentation ..... 102**

a. PowerPoint Slides ..... 103

DNP Project Plan

Abstract

Pain is the most common reason people seek healthcare. Initiatives to prevent the undertreatment of pain have resulted in overreliance on opioids to treat pain. Despite significant increases in opioid use, pain is more prevalent than ever. Additionally, devastating consequences from opioid use have resulted, such as dependence, addiction, and increasing opioid-related deaths. Research demonstrates multimodal analgesic therapy is an effective alternative to the overreliance on opioids to treat pain. Multimodal analgesia is the synergistic use of two or more analgesics with different mechanisms of action. Multimodal analgesia produces significantly more effective and efficient pain management than opioid-only therapy. This project will focus on implementing multimodal analgesia pain management practices and determine its effect on opioid use on an Observation unit.

Keywords: multimodal analgesia, pain management, opioid use

# Effect on Opioid Use following the Implementation of Evidence-Based Pain Management Practices for an Observation Unit

Pain is the most common reason people in the United States (US) seek healthcare and is the primary cause of disability in the US (National Institutes of Health, 2013). The International Association for the Study of Pain (2012) defines pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage". Pain is more prevalent than diabetes, heart disease, stroke, and cancer combined (The National Center for Health Statistics, NCHS, 2006). The most common types of pain include low back pain (28.1%), headache or migraines (16.1%), neck pain (15.1%) and knee pain (19.5%) (Institute of Medicine, 2010). As a result, analgesics, such as opioids, are among the most commonly prescribed class of therapeutic medications for both inpatient and outpatient settings (NCHS, 2017).

A desire by clinicians to treat pain has led to the increase in opioid reliance. A large, prospective multicenter study found that only 60% of people who presented to the emergency department (ED) with pain received analgesics, and 3 of 4 of these individuals were discharged in moderate to severe pain (Todd et al., 2007). In response, pain was deemed undertreated and initiatives to increase clinician identification and treatment of pain were prompted. Initiatives include the American Pain Society “Pain as the fifth vital sign” campaign, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) pain management standards, and the World Health Organization (WHO) pain ladder to educate providers and patients on the stepwise approach for pharmacological treatment of pain. As a result, opioids were increasingly relied upon. Between 2000 and 2010, patients treated for pain pharmacologically in the ED increased from 56% to 71%, although patients treated exclusively with non-opioids decreased 21%, from

28% to 22% (Chang, Daubresse, Kruszewski, & Alexander, 2014). Furthermore, opioid prescriptions quadrupled, opioid use in EDs increased 60%, and opioid sales skyrocketed 400% between 1999 and 2010 (Centers for Disease Control and Prevention [CDC], 2011; CDC, 2016; Simon, 2012).

Despite efforts to combat undertreatment of pain with opioids, overreliance on opioids proved ineffective and is leading to devastating consequences. There has been no change in self-reported pain prevalence since 1999, and the percentage of patients seeking care in the ED for severe pain has increased from 25% to 40% between 2003 and 2008 (CDC, 2016; Chang et al., 2014). Nearly 25% of individuals who have received long term opioid prescriptions struggle with addition (Boscarino et al., 2010). In 2011, approximately 1.5 million people were treated in the ED due to prescription drug misuse, nearly triple the amount from 2004 (Substance Abuse and Mental Health Services Administration, SAMHSA, 2013). Additionally, there has been an annual increase in opioid related deaths, a 300% increase in reported opioid abuse, and nearly fourfold increase in substance abuse related admissions (SAMHSA, 2010).

Contributing to this opioid crisis is the weak evidence it is based upon. The WHO pain ladder is frequently used as justification for prescribing opioids for persistent or severe pain (Blondell et al., 2013; Teater, 2014). Unfortunately, the WHO pain ladder was developed by expert opinion for cancer-related pain, and not built upon randomized controlled trials (Vargas-Schaffer, 2010). A letter to the editor of the New England Journal of Medicine further promoted the misconception of the safety of opioids. Porter and Jick (1980) reviewed nearly 12,000 hospitalized patient records for evidence of opioid addiction after receiving at least one opioid. The authors identified just 4 records with reasonable documentation of addiction; thus, concluding that opioid addiction is rare (Porter & Jick, 1980).

Efforts to decrease reliance on opioids have emerged. Guidelines that dissuade clinicians from dependence on opioids are increasing. This includes a 2012 American College of Emergency Physicians guideline recommending short-acting opioid prescriptions for musculoskeletal pain, avoidance of opioids for chronic non-cancer pain, and reserving opioids for the most severe back pain complaints (Cantrill et al., 2012). The American Society Anesthesiologists Task Force on Acute Pain Management (2012) released a guideline recommending multimodal techniques for pain management. Nevertheless, uptake of these guidelines is either incomplete or ineffective, as 2015 was the deadliest year on record for opioid-related deaths (CDC, 2017).

Scientists are beginning to challenge the opinion that opioids are the only effective treatment for severe pain (Teeter, 2014). Instead, the approach to pain management should be focused on alleviating the cause of the noxious stimuli. The primary mechanisms of pain sensation are nociceptive and neuropathic (Woolf, 2004). Each causes pain through a unique mechanism. Thus, each pain classification needs a different approach to reduce the painful stimuli. Rarely, however, is pain caused by a single mechanism. Pain is most often multifactorial – meaning the pain sensation is a product of more than one mechanism, and needs to be treated accordingly (Xu & Yaksh, 2011).

In order to improve the treatment of pain, understanding the mechanisms that lead to the interpretation of pain is necessary. Nociceptive pain occurs when nociceptors (nerves that transmit pain signals) detect a noxious stimulus with potential to cause harm to the body (Nicholson, 2006). Nociceptors transmit signals via the pain pathway from the peripheral nervous system (PNS) to the central nervous system (CNS) where the signal is interpreted as pain (Xu & Yaksh, 2011). The most common trigger of nociceptors is actual or potential tissue

damage (Nicholson, 2006). Inflammation occurs as the body's immune system responds to the actual or potential tissue damage (Xu & Yaksh, 2011). Neuropathic pain occurs when there is direct injury to the peripheral nerve, resulting in persistent pain sensation due to continuous activation of the nerve (Xu & Yaksh, 2011). Neuropathic pain can be a consequence of direct nerve injury, as in surgery or an injury, or indirectly through diabetic peripheral neuropathy, post-herpetic neuralgia, and cancer (Nicholson, 2006).

Several analgesics disrupt the transmission of the pain signal at various levels of the pain pathway. Opioids exert their analgesic effects by binding to opioid receptors on neuronal cell membranes, thus, inhibiting the afferent nerve transmission responsible for communicating pain (Busti, 2015). The primary effect of opioids on the nervous system produces analgesia, but concomitant effects also occur. Side effects of opioids include dizziness, nausea, constipation, respiratory depression, mood changes, physical dependence, tolerance, and a decrease in emotional distress (Benyamin et al., 2008; Chahl, 1996).

Non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen are non-opioid analgesics that work differently than opioids to reduce pain. NSAIDs reduce pain by blocking cyclooxygenases (COX-1 and COX-2) peripherally, enzymes responsible for the production of prostaglandins, a chemical central to inflammation, fever, and pain (Ogbru, 2016). Less inflammation equates to less noxious stimuli being perceived by nociceptors in the PNS. The mechanism of action for Acetaminophen is less understood. The belief is that acetaminophen blocks the COX-1 enzyme in the CNS, thereby reducing prostaglandins centrally and disrupting the neurotransmission of the pain signal in the brain and spinal cord (McNicol, 2008). Side effects of these non-opioids can be dangerous if taken long-term or in high doses; however, physical dependence and tolerance to these drugs are unlikely (Gavura, 2013).

An alternative to overreliance on opioids for treatment of pain is multimodal analgesia. Multimodal analgesia is combining two or more agents with different mechanisms of action to produce a synergistic effect on pain relief (Young & Buvanendran, 2012). A multimodal regimen could be tailored to the individual, mechanisms causing the pain, side effects of the medication, and the person's preexisting medical and psychosocial conditions (Buvanendran & Kroin, 2009). Multimodal analgesia has the potential to relieve pain at multiple levels of the pain pathway by optimizing dosages of separate agents to produce maximum efficacy while minimizing side-effects that can occur when relying on a high dose single analgesic (Young & Buvanendran, 2012).

This Doctor of Nursing Practice (DNP) project will focus on identifying literature regarding efficacious pain management practices, such as multimodal analgesia, with the potential of reducing reliance on opioids. The setting for this DNP project is an ED Observation (OBS) unit in a freestanding midwestern hospital. An OBS unit is a clinical area of the ED where cohorts of patients needing extended ED care are placed for continued observation (Salvador-Kelly, Kwon, & Wheatley, 2016). The OBS unit is an ideal setting because many patients present to the ED with pain and are cared for by the OBS unit. The providers and registered nurses (RN) are accountable to their patients and must deliver effective pain management that provides the most benefit while producing the least amount of harm.

## Current Practices

The current practices of pain management on the OBS unit were assessed. The goal of this analysis was to determine what extent the OBS unit relies on opioids to treat pain. To do this, a report from the two Pyxis systems on the OBS unit was generated. This report contained data on analgesics withdrawn over a 60-day period from May 5, 2017-July 4, 2017. Analgesics

included were morphine, dilaudid, acetaminophen/hydrocodone (Norco), oxycodone, acetaminophen/codeine (Tylenol #3), acetaminophen, and ibuprofen. Morphine, dilaudid, and oxycodone are opioids. Norco and Tylenol #3 are multimodal analgesics as they contain both opioid and non-opioid ingredients. Acetaminophen and ibuprofen are non-opioids. For this analysis, it was assumed that if the medication was withdrawn from the Pyxis and the withdrawal was not canceled, then the medication was administered to the patient.

Over the 60-day period, 2,737 analgesics were withdrawn. Each withdrawal corresponded to a patient's medical record number (MRN). The DNP student organized the data by MRN and identified 627 unique patient MRNs. A manual electronic health record (EHR) review of every $10^{th}$ MRN was conducted (n = 62). Variables collected were age, total morphine milliequivalent (MME) received on the OBS unit, admit date, the first 10 pain assessment scores (on a scale of 0-10 with 0 being no pain and 10 being the worst possible pain) obtained on the OBS unit, the date of each of the pain scores, and medications administered (drug name) at the time of the pain score. Furthermore, if non-opioids were ordered while on the OBS unit (yes or no) and whether the non-opioid was administered if ordered (yes, no, or NA) was collected. The data was assessed to describe the population and identify trends.

The entire data set was analyzed for use patterns. Of the 2,737 analgesic withdrawals, 2121 (77%) were opioid-containing analgesics (see Appendix A, figure 1). Withdrawals were categorized by medication (see Appendix 1, figure 2). Oxycodone was the most frequently used, followed by dilaudid and acetaminophen. Oxycodone was used more than the non-opioid analgesics (acetaminophen and ibuprofen) combined. Norco, dilaudid, and acetaminophen were used equally. Acetaminophen was used 6 times more often than ibuprofen.

The data set was analyzed by patient MRN. Ten percent, or 62, of the 627 unique patients were selected for collection of variables by manual EHR review. The sample population (n=62) ranged in ages from 18 to 99 of age with a mean age of 51.3 (standard deviation [SD] 19.8) years.

The mean pain assessment score of the 62 patients upon arrival to the unit was 4.63 out of 10 (SD 3.3). Twenty-six (42%) patients were administered an analgesic after the first pain assessment with a mean pain score of 6.23 (SD 2.49). Of the patients (n = 26) treated for pain upon arrival, nearly 75% (n=19) were given an opioid-containing analgesic. Norco was the most frequently used analgesic upon arrival (see Appendix A, figure 3). Pain scores provided by the sample participants indicated patients were consistently administered analgesics at higher pain scores (see Appendix A, figure 4).

The sample was analyzed to determine prescriber (physician, nurse practitioner [NP], and physician assistant [PA]) and administrator (Registered Nurse [RN]) practices. Prescriber practices were assessed for trends by identifying if a non-opioid was ordered. Administrator practices were assessed for trends by identifying if the RN administered the ordered non-opioid. Findings demonstrated 75% (n=47) of sample participants had a non-opioid ordered. Of those, only 60% (n=28) were administered a non-opioid analgesic. In sum, non-opioids were either not prescribed (n=15), or prescribed but not administered (n=19), resulting in 55% (n=34) of sample participants receiving only opioid-containing medications for pain (see Appendix A, figure 5).

The entire data (N=2727) set was analyzed again for trends in analgesic use. The MRNs were categorized into 3 analgesics receiving groups: opioid-only (oxycodone, morphine, and/or dilaudid), multimodal (combination of opioid, acetaminophen, and/or ibuprofen), and non-opioid only (see Appendix A, figure 6). Patients who received Norco or Tylenol #3 were placed in the

multimodal category. A total of 463 (74%) patients received at least one opioid or opioid-containing analgesic (Norco or Tylenol #3) during the 60-day period examined in this data. One in 3 patients (n = 206) received only opioids (oxycodone, morphine, and/or dilaudid) for pain.

## Problem Statement

Overreliance on opioids for the treatment of pain is a public health issue, that often leads to devastating consequences. The OBS unit appears to practice this trend as well. Nearly 80% of the analgesics used contain opioids and one third of its patients receive exclusively opioids for pain treatment. The bottom line is pain is real, but opioids are dangerous, addictive, and have been ineffective in improving self-reported pain despite significant use (CDC, 2016; Chapparo et al., 2014). The opioid crisis cannot be solved on the OBS unit. However, OBS providers and RNs have a duty to their patients to give them the best care available. The importance of treating pain effectively while mitigating the devastating consequences of overreliance on opioids led to the clinical question for this DNP project: Does implementation of an evidence-based pain management protocol on the OBS unit produce efficacious pain treatment while simultaneously reducing opioid consumption? This project will determine best practices as identified by the highest level of evidence available in current literature and evaluate the new process by comparing pre- and post-implementation data.

## Evidence-based Initiative

To determine the best practices for pain management, a literature review was undertaken. Providing effective pain management while simultaneously reducing overreliance on opioids will be the primary focus of the project; therefore, evidence-based methods that effectively reduce pain while shifting focus from opioid use was reviewed in the literature. Multimodal analgesia

was central to this literature review as it has the potential to reduce opioid use by emphasizing concomitant use of other analgesics with complimentary mechanisms of action.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline served as the framework for this literature review (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009). A comprehensive electronic search was conducted on the Cochrane Library database and was limited to Cochrane reviews published in the English language during the period of 2008 to 2017. The keywords used were multimodal, combined analgesia, pain, opioid sparing, opioid consumption, and opioid reduction. Inclusion and exclusion criteria were tailored to the characteristics of the OBS unit. The focus of the literature was to compare multimodal analgesic therapy to monotherapy with one of the agents used in the intervention group. The aim was fourfold:

- Does multimodal analgesic therapy produce better pain management than analgesic therapy with a single agent class?
- Does multimodal analgesic therapy result in reduced opioid consumption?
- Does multimodal analgesic therapy reduce frequency of administration of agents without compromising pain management?
- Does multimodal analgesic therapy produce more adverse events than use of a single agent class?

The search yielded 150 Cochrane reviews (see Appendix B). After screening and in-depth examination of the studies, 9 articles were included in the literature review (see Appendix C). Findings of this literature review suggest multimodal therapy of at least 2 analgesics with different mechanisms of action can produce better and longer pain management without increasing adverse effects. Five reviews concluded that multimodal analgesic therapy is superior

to use of single drug therapy. Four of these 5 were assessing acute postoperative pain (Derry et al., 2013; Derry et al., 2013a; Moore et al., 2015; Toms et al., 2009). The fifth review was assessing pain after wisdom teeth extraction (Baily et al., 2013). The remaining 4 reviews cited limited availability of RCTs to make a definitive conclusion; however, each found evidence supporting the superiority of multimodal analgesia over single drug therapy (Ashfar et al., 2015; Chapparo et al., 2012; Derry et al., 2015; Ramiro et al., 2011).

A key finding of this review was ability to achieve at least a 50% reduction in pain when using multimodal analgesia. This finding suggests that pain etiology is multifactorial and requires treatment through multiple pathways. Combinations of NSAIDs, Acetaminophen, Oxycodone, and Codeine demonstrated greater efficacy of pain management than single drug therapy in postoperative and dental pain (Baily et al., 2013; Derry et al., 2013; Derry et al., 2013a; Moore et al., 2015; Toms et al., 2009). An antispasmodic is the only drug found in this review that does not appear to make a difference when used in multimodal therapy (Ashfar et al., 2015; Chapparo et al., 2012).

Multimodal analgesia also increased the time needed for remedication for pain. Increasing the time between analgesia doses decreases the patient's exposure to analgesics. This is particularly beneficial because over-exposure to opioids can cause a state of opioid-induced hyperalgesia (OIH). OIH is a response to opioids where a patient may develop nociceptive sensitization from opioid exposure (Lee, Silverman, Hansen, & Patel, 2011). In short, high exposure to opioids can lead to a paradoxical response of increased pain. Thus, the benefit of producing longer response to pain management through multimodal analgesia decreases the exposure to potentially pain-inducing analgesia.

None of the reviews examined opioid consumption. Two reviews, however, presented evidence that the addition of a nonopioid to an opioid drug provided more efficient and effective analgesia (Derry et al., 2013; Moore et al., 2015). For example, Derry et al. (2013) found that the addition of Ibuprofen to Oxycodone produced a higher level of pain management efficacy and significantly longer time to remedication for pain than Oxycodone alone. Thus, the addition of Ibuprofen to Oxycodone can result in a reduction in total opioid consumption over the course of the painful experience. While Moore et al. (2015) demonstrated that the addition of Acetaminophen 650mg to Oxycodone 10mg was more efficacious than Oxycodone at a higher dose (15mg) given in isolation (NNT 2.7 [2.4 to 3.1] compared to NNT 4. 6 [2.9 to 11], respectfully). Furthermore, a multimodal regimen of two nonopioids (Ibuprofen 400mg + Acetaminophen 1000mg) had a lower NNT (1.5 [1.4 to 1.7]) than Oxycodone 15 mg taken in isolation (NNT 4.6 [2.9 to 11]) (Moore et al., 20150. These are promising results, suggesting that strategic use of analgesics can produce the dual benefit of greater analgesia and reduced opioid consumption.

Adverse events had either no difference between groups or significantly less in the groups receiving multimodal therapy. Thus, adverse events should not be a reason to avoid multimodal therapy for pain. However, NSAID therapy is often avoided due to the fear of its adverse events. Concerns about increased risk of bleeding (from inhibition of platelet aggregation) postoperatively and gastrointestinal effects (particularly in the elderly) may prevent a clinician from using NSAIDs for pain (Solomon, 2016). NSAIDs used short term (<10 days) at the lowest effective dose, however, is relatively safe (Aminoshariae, A., Kulild, J. C., & Donaldson, 2016). Lower doses of Ibuprofen can be as effective as higher doses. Moore et al. (2015) found evidence that ibuprofen 400mg (NNT 2.1 [1.9 to 2.3]) can be as or more effective

than ibuprofen 600mg (NNT 2.7 [2.0 to 4.2]). In sum, multimodal therapy with an NSAID is effective, does not produce more adverse events, and can be safe if used correctly.

The current literature underscores the potential of multimodal analgesic therapy. Dependence on opioids for pain treatment has primarily been based on expert opinion. This literature review demonstrated multimodal analgesic therapy is an efficacious alternative approach to overreliance on opioids for pain management in certain conditions. It also highlighted the importance that combining analgesics with different mechanisms of action can increase time to remedication without inducing additional adverse effects. Opioids still play an important role in pain management; however, these drugs should no longer be considered the primary tool for pain treatment. Instead, using opioids in conjunction with other drugs can intensify analgesia and may increase the duration of its therapeutic effect. These findings offer evidence to improve pain management practices and provide a strategy to treat pain without perpetuating the opioid crisis on the OBS unit.

## Conceptual Model

To assist in the successful implementation and sustainability of this project, both a theoretical and an implementation conceptual model will serve as the guide for project application. Conceptual models are useful because they highlight elements crucial to the success of a project that may have not been otherwise considered or addressed. The theoretical model used for this project is the Promoting Action on Research in Health Sciences (PARiHS) framework. The implementation model for this project is Kotter's 8 steps of change.

### Theoretical Model - Promoting Action on Research in Health Sciences Framework

The phenomenon of the reliance on opioids despite overwhelming evidence and professional consensus is best viewed through the PARiHS framework. The PARiHS framework

was created in 1998 for the purpose of providing a checklist for successful implementation of research into practice (Kitson, Harvey, & McCormack, 1998). Kitson et al. (1998) argue that successful implementation of research into practice is a function of three core elements – evidence, context, and facilitation. Far too often implementation of evidence-based practice has failed because the complexity of the change process has not been captured (Kitson et al., 1998). Kitson et al. (1998) propose that the context of the environment and the way in which the change process is facilitated is as important as the level and rigor of evidence being implemented. The following equation emerged from the creation of this framework:

- SI = f (E,C,F)
    - where SI = successful implementation, f = function of E = evidence, C = context, and F = facilitation.

**Evidence.** Kitson et al. (1998) defines evidence as the combination of research, clinical expertise, and patient choice. Research can range from low quality (anecdotal or descriptive) to high quality (RCTs, systematic reviews, evidence-based guidelines). Clinical experience, or professional consensus, involves a spectrum of low consensus (divided expert opinion) to high consensus (consistency of view). Finally, patient preference can range from low input (patient's opinion completely overlooked) to high input (patient's feedback consistently included in decision making). See Appendix D A to view the continua of evidence.

**Context.** Context is defined as the environment or setting where the proposed change will occur (Kitson et al., 1998). Context is the underlying forces at work that give the environment its character and feel. Context is composed of culture, leadership, and the measurement of systems and services (Kitson et al., 1998). Each of these elements run along a continuum of low to high context (see figure 2 B the view the continua of context). Culture is

considered high when it is people-centered and emphasizes continual learning as opposed to task driven and low regard for the people who work and are cared for in the setting. High context of leadership occurs when everyone has clear roles, effective organizational structure is in place, and team work is evident. High context of measurement occurs when there are routine, established systems of measuring performance.

**Facilitation.** Facilitation refers to a technique by which a person can make things easier for others (Kitson et al., 1998). The facilitator is the person who provides support to help others change their attitudes, habits, skills, ways of thinking, and workflow in order to make the change easier. The facilitator must help people understand why the change is necessary and motivate them to achieve the desired outcome. Successful facilitation requires the facilitator to possess high levels of three core elements – characteristics, role, and style (Kitson et al., 1998). Personal characteristics of openness, respect, and credibility, clarity surrounding the facilitator's role, and flexible, consistent style are vital for successful facilitation. See figure 2 C to view the continua of facilitation.

**Successful Implementation.** For successful implementation, consideration of each element (evidence, context, and facilitation) is vital. Implementation of a project has the best chance for success when there is high evidence, high context, and high facilitation. As previously discussed in the evidence-based initiative section, the evidence for this DNP project is the highest level (systematic reviews). To better understand the context and effective methods of facilitation for this project, an organizational assessment and analysis of strengths, weaknesses, opportunities, and threats (SWOT) of the OBS unit was undertaken.

**Implementation Model – Kotter's Eight Step Change Model**

When implementing this project, Kotter's Eight Step Change Model will serve as the guiding framework to promote the success of this practice change (see Appendix E). Kotter created this model after observing more than 100 companies attempt transformation (Kotter, 1996). In response to his observations, he identified three phases, consisting of 8 steps, that are necessary for successful change in an organization (Kotter, 1996).

**Creating Climate for Change.** The first phase of Kotter's 8 step process is creating climate for change. This first phase consists of the first three steps geared to transforming the climate to make it ready for change. The first step is creating a sense of urgency (Kotter, 1996). To create a sense of urgency, the facilitator must inspire everyone else that there is an opportunity that must be acted on immediately (Kotter International, 2017). The second step is building a guiding coalition (Kotter, 1996). During this step, a volunteer army who believes in this change is enlisted to champion the project (Kotter International, 2017). The third step, and final in creating a climate for change, is creating a vision for change (Kotter, 1996). When a vision is created, people can focus on it more clearly and adapted to the strategies necessary to achieve the vision (Kotter International, 2017).

**Engaging and Enabling the Organization.** The second phase of Kotter's 8 Step Change Model is engaging and enabling the organization. This second phase also consists of the next three steps of the model for its achievement. The fourth step is communicating the vision for buy-in (Kotter, 1996). At this point, the organization and facilitator need to make sure the people understand the vision and accept the strategy to obtain it (Kotter International, 2017). The fifth step is empowering action (Kotter, 1996). During this step, barriers to action must be removed to promote the freedom necessary to create real impact (Kotter International, 2017). The sixth step,

and final in engaging and enabling the organization, is creating quick wins (Kotter, 1996). Recognizing short-term successes energizes the champions and promotes buy-in from everyone involved (Kotter International, 2017).

**Implementing and Sustaining for Change.** The last phase of Kotter's 8 Step Change Model is implementing and sustaining for change. This final phase consists of the last two steps in the model. The seventh step is building on the change (Kotter, 1996). At this point in the change process, it is important to not let up. The first successes of the process have earned credibility for the change and must be used to accelerate for more improvement of systems, structures, and policies (Kotter International, 2017). The eighth and final step is making it stick (Kotter, 1996). This is when the new behaviors of the process are connected to the success of the organization (Kotter International, 2017). By this time, it is important to ensure that the new behaviors become strong enough to replace old habits.

## Feasibility Assessment of the Organization

Successful implementation of a practice change in any organization can be challenging. A feasibility assessment of the organization's ability to accept change is helpful prior to identify facilitators or barriers to change. To assess feasibility, several factors were identified and accounted for, such as the organizational culture, external environment, and unit climate. To systematically account for these factors, and organizational assessment of the OBS unit using the Burke-Litwin Causal Model (see Appendix F) and a SWOT analysis (see Appendix G) was performed.

### Burke-Litwin Causal Model

The Burke-Litwin Causal Model was chosen as it can be used to define and identify organizational dimensions which are linked causally in order to promote and achieve change

(Burke & Litwin, 1992). Burke and Litwin (1992) hypothesize that there are two distinct sets of dynamics within an organization – climate and culture. Climate refers to the conscious perceptions employees have about how the local work environment is managed and how well day-to-day colleagues collaborate (Burke & Litwin, 1992). Culture is the underlying set of values and norms in the organization, a collection of overt and covert rules that guide organizational behavior, and is more background than climate (Burke & Litwin, 1992). The variables that define organizational climate are transactional factors; and those that define culture are transformational factors.

Transformational factors are the most influential forces of change for an organization. Transformational factors include the external environment, mission and strategy, leadership, organizational culture, and individual and organizational performance (Burke & Litwin, 1992). Of these factors, Burke and Litwin (1992) argue that the external environment is the most persuasive transformational factor to drive change within an organization.

Transactional factors are the structural components of a work environments climate. Transactional factors consist of everyday exchanges between members of the organization. These factors explain the reciprocity of human behavior – in other words, “You do this for me and I’ll do that for you” (Burke & Litwin, 1992, p. 530). Transactional factors include structure, management practices, systems, work unit climate, task and individual skills, motivation, individual needs and values, and individual and organizational performances (Burke & Litwin, 1992).

The 12-distinct transformational and transactional factors of the organization and OBS unit were assessed. After assessment, several facilitators and barriers to this project were identified. The assessment also exposed an opportunity to improve pain management through use

of non-opioids on the unit. The external environment revealed an opioid crisis, making the overreliance on opioids in the OBS unit a significant problem. The mission and strategy, leadership, culture, structure, management practices, work unit climate, individual abilities and values of the staff, motivation, and performance measures of the organization serve as facilitators to the practice change. The only potential barrier identified lies within the systems of the organization. Presently, non-opioid analgesics such as acetaminophen or ibuprofen, may only be given for mild pain, identified through a reported pain score of 1-3 (on a scale of 0-10) or per patient's description of the pain. Oral opioids, such as hydrocodone and oxycodone, should be given for moderate pain, identified through a reported pain score of 4-7 or per patient's description. Intravenous opioids, such as morphine or dilaudid, should only be given for severe pain, identified from a reported pain score of 8-10 or per patient's description. As this policy is currently written, the RN would not be able to administer an opioid and a nonopioid analgesic simultaneously. This is a barrier that must be addressed with as part of this project.

**Strengths, Weaknesses, Opportunities, and Threats Analysis**

A SWOT analysis is a synthesis for an organization's current state. It involves identification of an organization's internal strengths and weakness, and its external opportunities and threats. Internal strengths of an organization are what gives the organization a competitive edge over its competitors (Fallon, 2017). Weaknesses of an organization are internal factors the organization can influence and correct. Opportunities refer to forces in the external environment that the organization has no control over yet influences how an organization functions (Fallon, 2017). Growth opportunities can be considered, and once identified, should be invested in. Threats are also forces of the external environment that an organization has no control over yet can influence and cause trouble to organization if not anticipated (Fallon, 2017). Awareness of

the organization's SWOT analysis identifies areas organization can build on or mitigate when seeking improvement from its current state. As shown in figure 2, a SWOT analysis was performed on the OBS unit, specifically in relation to a pain management practice change.

Strengths of and opportunities for the OBS unit were identified. Strengths of the OBS unit include its providers, nurses, and its affiliation with Spectrum Health, a nationally ranked healthcare system, which provides support for process improvements. Opportunities for the OBS unit in relation to improving its pain management practices include public attention on the opioid crisis and need for better practices, potential to reduce opioid-misuse related hospitalizations, and enhancement of quality care by introducing evidence-based practice. These must be capitalized on as they can facilitate an organizational practice change.

Weaknesses of and threats to the organization was also identified. It is important to address these in order to mitigate their effect on a practice change project. Weakness of the OBS unit that could hinder a pain management practice change. The weaknesses include the simultaneous implementation of Epic in November, variety of pain causing conditions patients present with, prescriptive analgesic orders in the electronic health record, and limited patient length of stay. Threats to the OBS unit in relation to a pain management practice change include patient desire for opioids, reimbursement tied to patient satisfaction, and potential that the entire staff will not buy-in to the change. The weaknesses and threats must be addressed during the practice change so their effect is mitigated.

## Project Plan

### Purpose of Project

The purpose of this DNP project is to implement multimodal analgesia, an evidence-based pain management practice, into the standard of care on the OBS unit. This project will

seek to answer the clinical question: Does promotion of multimodal analgesia, an evidence-based pain management method, on the OBS unit produce efficacious pain treatment while simultaneously reducing opioid reliance and consumption?

**Objectives and Implementation Strategies**

Objectives for this DNP project will be aimed at promoting uptake of multimodal pain management practices among the staff. Evidence-based implementation strategies will be used to support these objectives. The following are the objectives with strategies for achievement that will be used for this DNP project.

1. Build a coalition prior to implementation on December 1, 2017

Identifying and utilizing change champions within an organization is an evidence-based strategy for increasing uptake of a practice change (Kaasalainen et al., 2015). Implementation science experts define building a coalition as recruiting and cultivating relationship with others to partner in the implementation effort (Powell et al., 2015). Steps to achieve this objective include:

- Presenting multimodal analgesia evidence to the OBS unit Shared Leadership Committee on October 18, 2017. The RNs at this meeting reported buy in for this change and agreed to serve as change champions.
- Cultivating relationships with the OBS unit charge RNs and requesting their participation in the promotion of this project. An email will be sent to the charge RNs prior to December 1, 2017 with steps on how to promote the project during shift huddles.
- Meeting with the medical director to discuss evidence for the project. The medical director is the local opinion leader for the OBS unit providers. Having his partnership for

this project will help influence colleagues to adopt multimodal therapy into the standard of care (Powell et al., 2015).

2. Educate the providers and RNs on multimodal pain management by December 1, 2017

Educating the providers and RNs about the evidence supporting multimodal analgesia is essential to this DNP project. Educational meetings combined with other interventions such as audit and feedback can help change professional behaviors and improve patient health outcomes (Forsetlund et al., 2009). Steps to achieve this objective include:

- Educating the RNs will occur during the November staff meetings. A 15 minute presentation about the evidence supporting multimodal pain management and strategies to promote practice into standard care will be conveyed.
- Educating the providers through email (see Appendix H for sample email). Unfortunately, the providers do not have OBS unit specific staff meetings; however, distributing educational materials electronically is a recognized implementation strategy by implementation science experts (Powell et al., 2015). A peer reviewed published article with multimodal analgesia evidence (Teater, 2014) will be included.
- Creating an educational flyer and dispersing it strategically on the OBS unit. The flyer will include evidence for multimodal pain management, tips and reminders for providers to order several agents with different mechanisms of action, and scripting for providers and RNs to inform patients about the benefits (see Appendix I for sample flyer). Printed educational materials are effective strategies to promote process changes (Farmer et al., 2008). Strategic locations include the nurses' station, computers where providers chart, the DCI board, and the break room. An additional copy will also be provided for each RN and placed in his or her mailbox.

3. Create and embed multimodal medication order (oxycodone and acetaminophen) into OBS unit frequently used order sets by December 1, 2017.

Implementation of best practices into standard care is increased with the use of order sets (O'Connor, DeCaire, & Friedrich , 2005; Ozdas et al., 2006; Stantolin & Boyer, 2004). With the implementation of Epic on November 5, 2017, implementing an evidence-based analgesic orders that allow for increased multimodal analgesia into existing OBS order sets will be delayed several weeks. Steps to achieve this objective include:

- Meeting with the pharmacist in November, 2017 to create evidence-based multimodal analgesic order indication
- Meeting with the OBS unit CNS and medical director in December, 2017 to present evidence to support the change for acetaminophen and ibuprofens indication within the OBS unit order sets (see Appendix J).

4. Perform weekly audit and feedback for 60-days after implementation, starting after December 1, 2017.

Audit and feedback is the summary of clinical performance data that allows clinicians to monitor, evaluate, and modify behavior (Powell et al., 2015). Audit and feedback is most effective when baseline adherence to recommended practice is low and feedback is delivered intensely (Jamtvedt, Young, Kristoffersen, O'Brien, & Oxman, 2006). Steps to achieve this objective include:

- The pharmacy technician providing the DNP student with a weekly Pyxis report of all analgesics withdrawn on the OBS unit
- The DNP student arranging the report by individual patient according to MRN

- Identifying percentage of patients who received opioid-only, multimodal, and non-opioid-only analgesic therapy
- Posting results on the DCI board for RNs to discuss during shift huddle and sending results to providers via email.
- Providing feedback on how to modify behavior to promote multimodal analgesic practices to RNs and providers.

5. Deliver final report on how the objectives achieved the purpose of this project and how it answered the clinical question by March 30, 2018.

Capturing and distributing local knowledge is an implementation strategy that seeks to share how clinicians changed practices in their settings (Powell et al., 2015). This strategy can encourage others to build on successes and promote quality improvement in other settings. Linking behaviors to successes is a crucial step in making behaviors part of the standard of care (Kotter, 1995). Steps to achieve this objective include:

- Posting results for OBS unit staff to see on the DCI board, at the nurses' station, and in the break room.
- Presenting results to RNs during March, 2018 staff meetings with deliberate credit given to RN's behaviors as essential to the results.
- Disseminating results to OBS providers via email by March 30, 2018 with deliberate credit given to the OBS providers behaviors being essential to the results,
- Presenting results to organization's Pain Management and Opioid Prescribing Steering Committee.

## Type of Project

This DNP project is a quality improvement project. A quality improvement project changes the delivery of healthcare through a systematic method in order to produce improved patient experience and outcomes (Tasker, 2013). This project seeks to improve the delivery of pain management on the OBS unit to reflect best evidence. By promoting multimodal pain management, patients will receive effective pain relief while limiting the harm that can occur with the overreliance on opioids.

## Settings and Resources Needed

This DNP project will take place on an OBS unit in a Midwestern freestanding hospital. Resources necessary to complete this DNP project include technology, people, and educational materials. Technology necessary to complete this project includes the EHR, Webex, email, and Survey Monkey. People needed to complete this project include OBS staff (RNs and Providers), OBS leadership (nurse manager, educator, CNS, and medical director), pharmacist, and pharmacy technician. Educational materials needed are flyers printed at fedex and weekly printed updates posted on the DCI board.

## Design for Evidence-based Initiative

The design of the evidence-based initiative is based upon the PARiHS framework. The DNP student considered the three core elements of the PARiHS framework when designing the evidence-based initiative for this project (see figure 2).

**Evidence.** Successful implementation of research into practice is more likely when the evidence is at the highest level. As established, the research for multimodal analgesic therapy has been demonstrated in several systematic reviews. Professional consensus for multimodal therapy for pain is also well established. The Joint Commission and the Institute for Clinical Systems

Improvement recommend the combination of opioids with non-opioids in order to reduce reliance on opioids for pain (The Joint Commission, 2012; Thorson et al., 2014). Furthermore, patient preferences are not to be ignored with this initiative. RNs and providers will be expected to involve the patients in the treatment of their pain. Staff will be encouraged to share the evidence for multimodal analgesia with the patient when presenting them with non-opioid alternatives or adjuncts for their pain treatment. Scripting on how to address patients concerns regarding multimodal analgesia will be provided for the staff to use when presenting this initiative to patients. Thus, confidence in the evidence this initiative is based upon underlies the foundation of this DNP project.

**Context.** There is a high level of context for this initiative as identified during the organizational assessment. This DNP project initiative will build upon the high context already established on the OBS unit (see Appendix . The initiative will emphasize patient-centered care by encouraging the staff to partner with the patients to promote and utilize multimodal analgesia. The roles will be clearly defined during the education phase of the project. The providers will be expected to order both opioid and non-opioid options for pain. The RNs will be expected to utilize a multimodal regimen according to the patient's individual needs. Teamwork will be encouraged by having providers and RNs work together to discuss the patient as an individual – such as, is this patient a candidate for an NSAID? The RN will be encouraged to ask the provider for a non-opioid order if the provider has not ordered one. The provider will be encouraged to give the RN advice on the etiology of the patient's pain and which strategies would be most effective at treating it. Measurement on progress through weekly feedback will be provided by the DNP student to the RNs and providers on how often multimodal analgesia was utilized. This feedback will be placed on the DCI board for RNs to review every shift. A weekly email of the

pilot project progress will be sent to the providers. If necessary, tips on how to improve multimodal analgesic utilize will be provided in real-time.

**Facilitation.** The facilitator is vital to the success or failure of the implementation of research into practice (Kitson et al., 1998). The DNP student will serve in the facilitator role. To increase facilitation, the DNP student recognized a barrier to remove. The DNP student identified during the needs assessment that Oxycodone was the most frequently used opioid on the OBS unit. Evidence exists that demonstrates Acetaminophen given with small dose Oxycodone (5-10mg) provides superior pain relief than large dose Oxycodone (15mg) given alone (Moore et al., 2015). However, Acetaminophen was rarely given in conjunction with Oxycodone because the order for Acetaminophen indicated it could only be given for mild pain, and Oxycodone could only be given for moderate to severe pain. The DNP student will remove this barrier and make this process easier on the providers and RNs. To do this, a new order set that links Oxycodone to Acetaminophen for moderate to severe pain will be created. This order set will then be inserted into frequently used OBS unit Epic order sets, facilitating the use of multimodal analgesia on the unit.

To further assist in facilitation of this DNP project, the DNP student will display respect and flexibility to ensure the success of this initiative. The DNP student will listen to and address concerns and suggestions for the project during the educating phase and throughout the pilot period. The DNP student will remain present during the pilot period by spending at least 8 hours per week on the unit. The DNP student will be a credible resource by remaining apprised on the progress of the project and all pertinent research related to the subject. The DNP student will be empathetic to any disruption of workflow this project may impact and respond immediately.

**Participants**

The participants in this DNP project are all patients treated pharmacologically for pain while on the OBS unit. The providers and RNs are encouraged to emphasize multimodal analgesia to address the patients' pain complaints. Patients treated for pain will be determined by a Pyxis report. Any patient that had an analgesic withdrawn for them while they were on the OBS unit will be included in this pilot project.

**Measurement: Sources of Data and Tools**

Measuring data is essential to evaluation of the project objectives, purpose and clinical question. Data will be collected through surveys, Pyxis report, EHR chart review, checklists, and observation. Several surveys will be created and used as tools to measure data.

Each objective will be measured. To determine the extent the coalition of change champions promoted multimodal pain management, a checklist and observation will be the tools for data collection. A shift huddle checklist will be put in the charge RN office for the charge RN to initial if the staff was updated on the weekly audit and feedback report put on the DCI board. The DNP student will also observe 4 shift huddles per week and note if the project is discussed at shift huddle. RN education will be measured through a pre- and post-survey at the November staff meeting (see Appendix K for survey sample). For RNs that attend the staff meeting in person, the surveys will be provided on paper. For RNs that attend the staff meeting through WebEx, the polling feature on WebEx with the survey questions will be administered immediately before and after the education. Education of the providers will be evaluated through SurveyMonkey. The providers will be asked to fill out the SurveyMonkey after reading the email education. The survey will ask if they read the education, if any of the information was new to them, and if they plan to change their behaviors after learning about the initiative. Use of the

multimodal medication order will be determined by EHR chart review. Data for the audit and feedback will be provided by the pharmacy technician. She will provide the DNP student with a list of analgesics withdrawn from both unit Pyxis' the previous 7 days. The DNP student will use this report and an EHR chart review to audit and provide feedback for the staff every week.

The purpose of the project is to promote uptake of multimodal pain management practices. This will be measured by determining how many patients received multimodal analgesia compared to those receiving opioid-only treatment. Data to inform this measurement will come from a Pyxis report generated by the pharmacy technician. Report on the following analgesic withdraws will be requested: morphine, dilaudid, oxycodone, Norco, Tylenol #3, tramadol, acetaminophen, Toradol, and ibuprofen. The report will be organized by MRN. Combination of analgesics withdrawn for each MRN will be determined and classified as opioid-only, multimodal, or non-opioid only. An increase in multimodal and decrease in opioid-only pain management will communicate that multimodal analgesia pain management practice promotion has been effective.

The clinical question this project seeks to address is whether multimodal pain management practices produce efficacious pain management while simultaneously reducing opioid reliance and consumption. Efficacious pain management will be determined through EHR chart review and patient satisfaction surveys. An EHR chart review will be conducted to determine the average pain assessment scores of patients receiving multimodal analgesic therapy. These scores will be compared to the scores of patients receiving opioid-only therapy. The monthly patient experience report will also be used to determine whether pain management was effective. A patient survey question on the patient experience report asks how well pain was controlled. Answers to this question from December 2017 and January 2018 will be collected.

Opioid consumption information will also come from the Pyxis withdrawal report. The ratio of opioid-containing withdrawals to non-opioid withdrawals will measure opioid reliance. The ratio of opioid-containing analgesic withdrawal per participant will be determined as a measure of opioid consumption.

**Steps for Implementation of Project**

To ensure that the clinical question, purpose, and objectives of this DNP project are addressed, Kotter's 8 step change model will serve as the guide. See Appendix L for the timeline of each step.

1. **Create a sense of urgency:** Beginning September, 2017, meetings with key stakeholders began. The DNP student met with the OBS manager, educator, and CNS several times between September and October, 2017 to begin planning the project.
2. **Create a coalition:** The DNP student met with OBS unit RN leaders at the unit shared leadership meeting on October 18, 2017. These RNs agreed to champion the project.
3. **Create a vision:** On October 26, 2017, the vision for this project will be presented and clarified among the project team.
4. **Communicate the vision:** Education for the project will be provided during the week of November 13, 2017. The vision of the project will be communicated in the RN staff meeting and through an email to the OBS providers.
5. **Empower action:** By December 1, 2017, a multimodal medication order that links oxycodone and acetaminophen for use for moderate to severe pain will be incorporated in any OBS unit order set that previously featured oxycodone alone. This will help remove that barrier of acetaminophen being indicated for only mild pain.

6. **Create Quick Wins:** Every Friday after December 1, 2017, a weekly audit and feedback will be posted on the unit DCI board and via email to the OBS providers. This will encourage the staff to build on successes.
7. **Building on the change:** Although the DNP student will discontinue providing weekly progress reports 60-days after implementation, a final review will be provided for the staff by March 1, 2018. The multimodal medication order will remain in the OBS order sets unless it is determined problematic. The final review will also be presented to the organization Pain Management and Opioid Steering Committee by March 30, 2018.
8. **Make it stick:** If determined successful, the multimodal medication order and education will be promoted for use in other organizational settings. A new DNP student will be designated to promote continued initiatives by April 1, 2018. Additionally, educational flyers will be placed in all new OBS unit RN orientee's education folder to ensure new RNs get the same education as the current RNs.

**Project Evaluation Plan**

The evaluation of this DNP project will occur throughout implementation and 60-days after the start of implementation. Evaluation of the objective occur throughout the implementation. The coalition strategy will be considered a success if the charge RN promotes multimodal analgesia during at least 75% of shift huddles, as measured by the checklist. Observation of four weekly shift huddles can also evaluate change champion participation. Education of RNs will be evaluated by determining whether an increase of survey scores is seen in the post-survey. Education of providers will be evaluated by how many providers respond to the SurveyMonkey, and how many of them report they will change behaviors to support the project. Utilization of multimodal medication order will be evaluated for frequency of use. Chart

review will be conducted on patients who had the multimodal medication order. If 85% or more of these patients received multimodal or non-opioid only therapy, the multimodal medication order will be considered a success. If utilization is low, efforts to promote increased use will occur during weekly feedback. Evaluation of audit and feedback will be determined by observation. The audit will be presented as charts and graphs, including frequency of analgesic withdrawn and percentage of patients receiving opioid-only, multimodal, or non-opioid therapy. Success of the audit and feedback strategy will be determined if behaviors are modified in response to feedback as evidenced by progressively improving audits, such as each week more patient receive multimodal therapy and less receive opioid-only therapy.

Evaluation of whether the purpose of the project was achieved will occur 60-days after the start of implementation. Implementation of multimodal pain management practices will be considered successful if participants receiving opioid-only therapy decreases 50% compared to pre-implementation data. Prior to implementation of this DNP project, 33% of patients treated for pain on the OBS unit received exclusively opioids for pain. If at the end of 60-days, the percentage of people receiving exclusively opioids for pain decreases to 16.5% or less, than the purpose will be achieved.

Evaluation of this project's success will ultimately be determined by how it answered the clinical question after 60-days. Multimodal analgesia will be considered an effective pain management practice if the pain assessment scores of patients who received multimodal analgesia are equal to or lower than the scores of patients who received opioid-only therapy. The pain treatment satisfaction question results from December 2017 and January 2018 on the patient experience report will be compared to the satisfaction results prior to implementation. If the satisfaction scores after implementation are equal to or greater than the pre-implementation

scores, then multimodal analgesia will be considered an effective pain management practice. Multimodal analgesia practices effect on opioid reliance will be considered effective if the disparity between opioid-containing withdrawal and non-opioid withdrawals decreases. Prior to implementation, 4 opioid-containing analgesics were withdrawn to every 1 non-opioid withdrawal. If the ratio becomes 3 opioid-containing withdrawals or less to every 1 non-opioid withdrawal, multimodal analgesia's effect on opioid withdrawal will be considered a success. Multimodal analgesia practice effect on opioid consumption will be considered effective if the ratio of opioid to person treated for pain on the OBS unit decreases. Prior to implementation, there were 2121 opioid-containing withdrawals for 627 people treated for pain on OBS over a 60-day period. This ratio results to 3.38 opioids consumed per person treated for pain. If the ratio decreases by 10%, or 3 opioids or less consumed per person treated for pain, then multimodal analgesia will be considered successful at decreasing opioid consumption.

**Ethics and Human Subjects Protection**

Ethical consideration was undertaken for this project. Application for this project was submitted to Grand Valley State University Human Research Review Committee's for Institutional Review Board (IRB) and the organization's IRB. The GVSU IRB determined this project did not meet the criteria of human research and was approved (see Appendix M). The organization IRB determined the same, and approved this as a quality improvement project (see Appendix N).

**Budget**

The budget for this DNP project must be addressed (see Appendix O). Most of the costs for this project with be donated by the DNP student serving as the project manager. The DNP student will be donating the time to create an education plan (20 hours), educating RNs at 4

separate staff meetings (4 hours), generating an informational flyer (4 hours), educate the providers via email (2 hours), and 8 hours per week during the 60-pilot period (8 weeks total). As the DNP student is an RN with 7 years' experience and not yet DNP-educated, the hourly rate for the DNP student's time will be calculated as $30 per hour (Pay Scale, 2017). The total donated cost for the project manager is $2,820. Furthermore, the Presidential Research Grant provided $114.80 to pay for educational flyers, a professionally printed white paper, and a binder to give to the unit after the project with steps for sustainability.

Other resources include time invested by staff to make this project possible. Two clinical nurse specialists (CNS) have been consulted to ensure that this DNP project is compliant with Joint Commission standards. The average hourly rate for a CNS is $48 (Salary.com, 2017a). A pharmacist was consulted to help make an order set to improve ease of implementation. An average pharmacist hourly rate is $60 (Salary.com, 2017b). In order to effectively educate the RNs of the project, 15 minutes will be added onto one staff meeting. Using a $30 hourly rate for 30 RNs to be educated for 15 minutes would cost the organization $225. Educating the providers could require up to 30 minutes of them reading the materials provided to educate them on the project. An average NP and PA hourly wage is $49 (Salary.com, 2017c). An ED physician hourly wage is $131 (Salary.com, 2017d). The pharmacy technician would spend one hour per week to generating the weekly pyxis report during the 8-week pilot project. The average hourly wage for a pharmacy technician is $16 (Salary.com, 2017e). The rest of the education will occur twice daily during shift change and will not add any additional expenses to the organization.

Potential cost savings of a plan to mitigate the OBS unit's contribution to the opioid epidemic must be considered as well. In Michigan, the rate of opioid-related admissions was 229.6 per 100,000 people in 2014 (Weiss et al., 2016). The population of Grand Rapids in 2014

was 194,321 people (United States Census Bureau, 2017). Using these statistics, it is calculated that in 2014 there were 445 opioid-related hospital admissions for the people in Grand Rapids. The average hospital length of stay when admitted for an opioid-related overdose is 3.8 days and costs $29,497 (Bachhuber, Saloner, Cunningham, & Barry, 2014). Thus, if at least one opioid-related hospital admission could be averted in the future by implementing this DNP project, then nearly $30,000 in hospital costs could be mitigated. Furthermore, if just one opioid-related ED visit could be prevented, then $3,640 additional costs could be mitigated (Bachhuber et al., 2014).

**Stakeholder Support and Sustainability**

Prior to beginning the DNP project at this site, stakeholder support was investigated. The site advisor for this project provided the DNP student with a letter of support (see Appendix P). Upon conducting this project at the site, more stakeholder support was gained. A member of the organization's Pain Management and Opioid Prescribing Steering Committee met with the DNP student several times for consultation. The DNP student has also been inviting to sit in on the Steer Committee monthly meetings as strategies to combat the opioid crisis will be discussed. Further support was gained from the OBS unit CNS who supports implementation of this evidence-based initiative organization-wide if the quality improvement project is successful.

Sustainability of this DNP project can be achieved several ways. First, the multimodal medication order created to facilitate multimodal pain management on the OBS unit will remain in place after completion of project. Second, the results of the project will be presented during the organization's Pain Management and Opioid Prescribing Steering Committee monthly meeting in March 2018. Finally, hand off of the project to a new DNP student will take place if the organization continues interest.

## Implications for Practice

There are major implications for practice that can be addressed with this DNP project. The opioid crisis is an established issue. Overreliance on opioids for the treatment of pain has led to devastating outcomes. Although this DNP project will not solve the opioid crisis, it will ensure that one facet of the healthcare system is doing its part to change its pain management practices to reflect evidence, not expert opinion. Taking the focus off of opioids as the only option for pain and shifting it to a multimodal approach has the potential to decrease opioid use entirely while achieving greater pain relief. Patients treated on the OBS unit during this project will be educated on evidence-based pain relief and can take that knowledge home with them. If this project prevents even one person from developing opioid dependence, then it has achieved its goal.

## Plans for Dissemination of Outcomes

The outcomes of this DNP project will be disseminated via various methods. The DNP project will be presented as part of the DNP student's final defense in March, 2018. Anyone from the organization and community are invited to attend. The outcomes will also be disseminated during a monthly meeting for the organization's Pain Management and Opioid Prescribing Steering committee. At this meeting, the DNP student will present recommendations for next steps, including disseminating this project organization wide. Finally, the DNP student will seek out opportunities to disseminate these outcomes to relevant professional journals and conferences.

References

Afshar, K., Jafari, S., Marks, A. J., Eftekhari, A., & MacNeily, A. E. (2015). Nonsteroidal anti-inflammatory drugs (NSAIDs) and non-opioids for acute renal colic. *The Cochrane database of systematic reviews*. doi: 10.1002/14651858.CD006027.pub2

American Society of Anesthesiologists Task Force on Acute Pain Management. (2012). Practice guidelines for acute pain management in the perioperative setting: an updated report by the American Society of Anesthesiologists Task Force on Acute Pain Management. *Anesthesiology, 116*, 248-273.

Aminoshariae, A., Kulild, J. C., & Donaldson, M. (2016). Short-term use of nonsteroidal anti-inflammatory drugs and adverse effects: an updated systematic review. *The Journal of the American Dental Association*, *147*, 98-110. doi: 10.1016/j.adaj.2015.07.020

Bachhuber, M. A., Saloner, B., Cunningham, C. O., & Barry, C. L. (2014). Medical cannabis laws and opioid analgesic overdose mortality in the United States, 1999-2010. *JAMA internal medicine, 174*, 1668-1673.

Bailey, E., Worthington, H. V., van Wijk, A., Yates, J. M., Coulthard, P., & Afzal, Z. (2013). Ibuprofen and/or paracetamol (acetaminophen) for pain relief after surgical removal of lower wisdom teeth. *The Cochrane Library*. doi: 10.1002/14651858.CD004624.pub2

Benyamin, R., Trescot, A., Datta, S., Buenaventura, R., Adlaka, R., Seghal, N., & Glaser, S. (2008). Opioid complications and side effects. *Pain Physician*, *11*, S105-S120. Retrieved from http://www.thblack.com/links/RSD/PainPhysician2008_11_S105_complications%26side-effects.pdf

Blondell, R. D., Azadfard, M., & Wisniewski, A. M. Pharmacologic Therapy for Acute Pain. *American Family Physician, 87*, 766-772. Retrieved from http://www.aafp.org/afp/2013/0601/p766.html

Boscarino, J. A., Rukstalis, M., Hoffman, S. N., Han, J. J., Erlich, P. M., Gerhard, G. S., & Stewart, W. F. (2010). Risk factors for drug dependence among out-patients on opioid therapy in a large US health-care system. *Addiction, 105*, 1776-1782. doi: 10.1111/j.1360-0443.2010.03052.x

Burke, W. W., & Litwin, G. H. (1992). A causal model of organizational performance and change. *Journal of management*, *18*, 523-545. doi: 10.1177/014920639201800306

Busti, A. J. (2015). The mechanism for opioid analgesics in the treatment of pain. In *Evidence-based Medicine Consult*. Retrieved from https://www.ebmconsult.com/articles/opioid-agonist-pain-mechanism-cns

Buvanendran, A., & Kroin, J. S. (2009). Multimodal analgesia for controlling acute postoperative pain. *Current Opinion in Anesthesiology, 22*, 588-593. doi: 10.1097/ACO.0b013e328330373a

Cantrill, S. V., Brown, M. D., Carlisle, R. J., Delaney, K. A., Hays, D. P., Nelson, L. S., ... & Whitson, R. R. (2012). Clinical policy: critical issues in the prescribing of opioids for adult patients in the emergency department. *Annals of emergency medicine*, *60*. doi: 10.1016/j.annemergmed.2012.06.013

Centers for Disease Control and Prevention (2016). *Wide-ranging online data for epidemiologic research (WONDER).* Retrieved from http://wonder.cdc.gov.

Ceyhan, D., & Güleç, M. S. (2010). Is postoperative pain only a nociceptive pain? *The journal of the Turkish Society of Algology, 22*, 47-52. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/21412369

Chahl, L. A. (1996). Opioids - mechanism of action. *Australian Prescriber, 19*, 63-65. doi:10.18773/austprescr.1996.063

Chang, H. Y., Daubresse, M., Kruszewski, S. P., & Alexander, C. G. (2014). Prevalence and Treatment of Pain in Emergency Departments in the United States, 2000-2010. *Pharmacoepidemiology and Drug Safety, 23*, 421-431. doi: 10.1016/j.ajem.2014.01.015.

Chaparro, L. E., Furlan, A. D., Deshpande, A., Mailis-Gagnon, A., Atlas, S., & Turk, D. C. (2014). Opioids compared with placebo or other treatments for chronic low back pain: an update of the Cochrane Review. *Spine, 39*, 556-563.

Chaparro, L. E., Wiffen, P. J., Moore, R. A., & Gilron, I. (2012). Combination pharmacotherapy for the treatment of neuropathic pain in adults. *The Cochrane Library*. doi: 10.1002/14651858.CD008943.pub2

Derry, S., Derry, C. J., & Moore, R. A. (2013). Single dose oral ibuprofen plus oxycodone for acute postoperative pain in adults. *Cochrane Database Syst. Rev*. doi: 10.1002/14651858.CD010289.pub2

Derry, C. J., Derry, S., & Moore, R. A. (2013a). Single dose oral ibuprofen plus paracetamol (acetaminophen) for acute postoperative pain. *The Cochrane database of systematic reviews, 6*. doi: 10.1002/14651858.CD010210.pub2

Derry, S., Karlin, S. M., & Moore, R. A. (2015). Single dose oral ibuprofen plus codeine for acute postoperative pain in adults. *The Cochrane Library*. doi: 10.1002/14651858.CD010107.pub3

Farmer, A. P., Légaré, F., Turcot, L., Grimshaw, J., Harvey, E., McGowan, J. L., & Wolf, F. (2008). Printed educational materials: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*, *3*. doi: 10.1002/14651858.CD004398.pub2

Forsetlund, L., Bjørndal, A., Rashidian, A., Jamtvedt, G., O'Brien, M. A., Wolf, F. M., ... & Oxman, A. D. (2009). Continuing education meetings and workshops: effects on professional practice and health care outcomes. *The Cochrane Library*. doi: 10.1002/14651858.CD003030.pub2

Gavura, S. (2013). Acetaminophen: still the pain reliever you should trust? In *Science-based Medicine*. Retrieved from https://sciencebasedmedicine.org/acetaminophen-still-the-pain-reliever-you-should-trust/

Institute of Medicine. (2010). *Relieving pain in america: A blueprint for transforming prevention, care, education, and research*. Washington, DC: National Academies Press.

International Association for the Study of Pain. (2012). IASP Taxonomy. Retrieved from https://www.iasp-pain.org/Taxonomy

Jamtvedt, G., Young, J. M., Kristoffersen, D. T., O'Brien, M. A., & Oxman, A. D. (2006). Audit and feedback: effects on professional practice and health care outcomes. *Cochrane Database Systematic Review*, *2*. doi: 10.1002/14651858.CD000259.pub2

Kaasalainen, S., Ploeg, J., Donald, F., Coker, E., Brazil, K., Martin-Misener, R., & ... Hadjistavropoulos, T. (2015). Positioning Clinical Nurse Specialists and Nurse

Practitioners as Change Champions to Implement a Pain Protocol in Long-Term Care. *Pain Management Nursing*, *16*(2), 78-88. doi:10.1016/j.pmn.2014.04.002

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: a conceptual framework. *Quality and Safety in Health Care*, *7*, 149-158. doi: 10.1136/qshc.7.3.149

Kotter International. (2017). 8-step process. Retrieved from https://www.kotterinternational.com/8-steps-process-for-leading-change/

Kotter, J. P. (1996). Why transformation efforts fail. *The Journal of Product Innovation Management*, *2*, 170.

Lee, M., Silverman, S., Hansen, H., & Patel, V. (2011). A comprehensive review of opioid-induced hyperalgesia. *Pain physician*, *14*, 145-161.

McNicol, E. (2008). Ask the professor: How does acetaminophen relieve pain? In *Tufts Journal*. Retrieved from http://tuftsjournal.tufts.edu/2008/04/professor/01/

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Prisma Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Medicine*, *6 (7)*, 1-6. doi: 10.1371/journal.pmed.1000097

Moore, R. A., Derry, S., McQuay, H. J., & Wiffen, P. J. (2015). Single dose oral analgesics for acute postoperative pain in adults. *Cochrane Database Syst Rev*, *9*. doi: 10.1002/14651858.CD008659.pub3

National Center for Health Statistics. (2017). Therapeutic drug use. In *Centers for Diseases Control and Prevention*. Retrieved from https://www.cdc.gov/nchs/fastats/drug-use-therapeutic.htm

National Institutes of Health. (2013). Pain management. In *Research Portfolio Online Reporting Tools*. Retrieved from https://report.nih.gov/nihfactsheets/ViewFactSheet.aspx?csid=57

Nicholson, B. (2006). Differential diagnosis: nociceptive and neuropathic pain. *The American Journal of Managed Care*, *12*, S256-62.

O'Connor, C., DeCaire, K., & Friedrich, J. (2005). Improving patient care through the use of evidence based order sets. In *AMIA Annual Symposium Proceedings*. American Medical Informatics Association.

Ogbru, A. (2016). NSAIDs drug information. In *RxList*. Retrieved from https://www.rxlist.com/nsaids_nonsteroidal_antiinflammatory_drugs/drugs-condition.htm

Ozdas, A., Speroff, T., Waitman, L. R., Ozbolt, J., Butler, J., & Miller, R. A. (2006). Integrating "best of care" protocols into clinicians' workflow via care provider order entry: impact on quality-of-care indicators for acute myocardial infarction. *Journal of the American Medical Informatics Association*, *13*, 188-196. doi: 10.1197/jamia.M1656

PayScale. (2017). Registered nurse in grand rapids, michigan salary. Retrieved from https://www.payscale.com/research/US/Job=Registered_Nurse_(RN)/Hourly_Rate/654714db/Grand-Rapids-MI

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., Matthieu, M. M., ... & Kirchner, J. E. (2015). A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science, 10*, 1-14. doi: 10.1186/s13012-015-0209-1

Ramiro, S., Radner, H., van der Heijde, D., van Tubergen, A., Buchbinder, R., Aletaha, D., & Landewé, R. (2011). Combination therapy for pain management in inflammatory arthritis

(rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis, other spondyloarthritis). *The Cochrane Library*. doi: 10.1002/14651858.CD008886.pub2

Salary.com. (2017a). Clinical nurse specialist hourly wages. Retrieved from http://www1.salary.com/Clinical-Nurse-Specialist-hourly-wages.html

Salary.com. (2017b). Pharmacist hourly wages. Retrieved from http://www1.salary.com/Pharmacist-hourly-wages.html

Salary.com. (2017c). Nurse Practitioner hourly wages. Retrieved from http://www1.salary.com/Nurse-Practitioner-hourly-wages.html

Salary.com. (2017d). Physician - emergency department hourly wages. Retrieved from http://www1.salary.com/ER-Doctor-hourly-wages.html

Salvador-Kelly, A. V., Kwon, N. S., & Wheatley, M. (2016). Emergency department observation units. In *AHC Media*. Retrieved from https://www.ahcmedia.com/articles/137660-emergency-department-observation-units

Solomon, D. H. (2016). NSAIDs: Therapeutic use and variability of response in adults. In *UpToDate*. Retrieved from https://www.uptodate.com/contents/nsaids-therapeutic-use-and-variability-of-response-in-adults?source=search_result&search=nsaid %20dosing&selectedTitle=1~150#H7

Simon, L. S. (2012). Relieving pain in America: A blueprint for transforming prevention, care, education, and research. *Journal of pain & palliative care pharmacotherapy*, *26*, 197-198. doi: 10.3109/15360288.2012.678473

Santolin, C. J., & Boyer, L. S. (2004). Change of care for patients with acute myocardial infarctions through algorithm and standardized physician order sets. *Critical Pathways in Cardiology*, *3*, 79-82. doi: 10.1097/01.hpc.0000128715.42953.78

Substance Abuse and Mental Health Services Administration. (2013). Highlights of the 2011 drug abuse warning network (DAWN) findings on drug-related emergency department visits. In *The DAWN Report*. Retrieved from https://www.samhsa.gov/data/sites/default/files/DAWN127/DAWN127/sr127-DAWN-highlights.htm

Tasker, F. (2013). How to lead a quality improvement project. In *Bmj Careers*. Retrieved from http://careers.bmj.com/careers/advice/view-article.html?id=20010482#ref2

Teater, D. (2014). Evidence for the efficacy of pain medications. In *National Safety Council*. Retrieved from http://www.nsc.org/RxDrugOverdoseDocuments/Evidence-Efficacy-Pain-Medications.pdf

The Joint Commission. (2012). Safe use of opioids in the hospital. In *Sentinel event alert: Issue 49*. Retrieved from https://www.jointcommission.org/assets/1/18/SEA_49_opioids_8_2_12_final.pdf

Thorson, D., Biewen, P., Bonte, B., Epstein, H., Haake, B., Hansen, C., & Hooten, M. (2014). Acute pain assessment and opioid prescribing protocol. In *Institute for Clinical Systems Improvement*. Retrieved from https://www.icsi.org/guidelines__more/catalog_guidelines_and_more/catalog_guidelines/catalog_neurological_guidelines/pain/

Todd, K. H., Ducharme, J., Choiniere, M., Crandall, C. S., Fosnocht, D. E., Homel, P., ... & PEMI Study Group. (2007). Pain in the emergency department: results of the pain and emergency medicine initiative (PEMI) multicenter study. *The Journal of Pain*, *8*, 460-466. doi: 10.1016/j.jpain.2006.12.005

Toms, L., Derry, S., Moore, R. A., & McQuay, H. J. (2009). Single dose oral paracetamol (acetaminophen) with codeine for postoperative pain in adults. *The Cochrane Library*. doi: 10.1002/14651858.CD001547.pub2

United States Census Bureau. (2017). Grand rapids city, michigan. Retrieved from https://www.census.gov/quickfacts/fact/table/grandrapidscitymichigan/PST045216

Vargas-Schaffer, G. (2010). Is the WHO analgesic ladder still valid? *Canadian Family Physician, 56*, 514-517. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2902929/pdf/0560514.pdf

Weiss, A. J., Elixhauser, A., Barrett, M. L., Steiner, C. A., Bailey, M. K., & O'Malley, L. (2016). Opioid-related inpatient stays and emergency department visits by state, 2009-2014. In *Healthcare cost and utilization project*. Retrieved from https://hcup-us.ahrq.gov/reports/statbriefs/sb219-Opioid-Hospital-Stays-ED-Visits-by-State.jsp?utm_source=AHRQ&utm_medium=EN-2&utm_term=&utm_content=2&utm_campaign=AHRQ_EN12_20_2016

Woolf, C. J. (2004). Pain: moving from symptom control toward mechanism-specific pharmacologic management. *Annals of Internal Medicine, 140*, 441-451.

Xu, Q., & Yaksh, T. L. (2011). A brief comparison of the pathophysiology of inflammatory versus neuropathic pain. *Current Opinion in Anaesthesiology*, *24*(4), 400.

Young, A., & Buvanendran, A. (2012). Recent advances in multimodal analgesia. *Anesthesiology Clinics, 30*, 91-100. doi:10.1016/j.anclin.2011.12.002

Appendix A

OBS Unit Needs Assessment

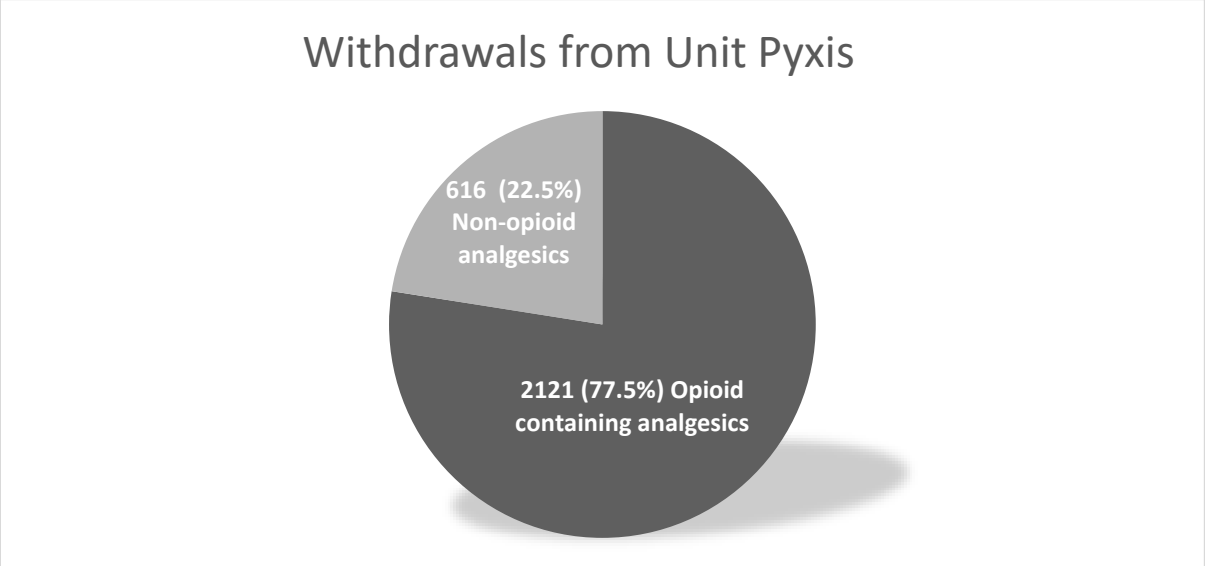



*Figure 1.* Total withdrawals from the Unit Pyxis' over a 60-day period broken down by opioid and non-opioid containing analgesics

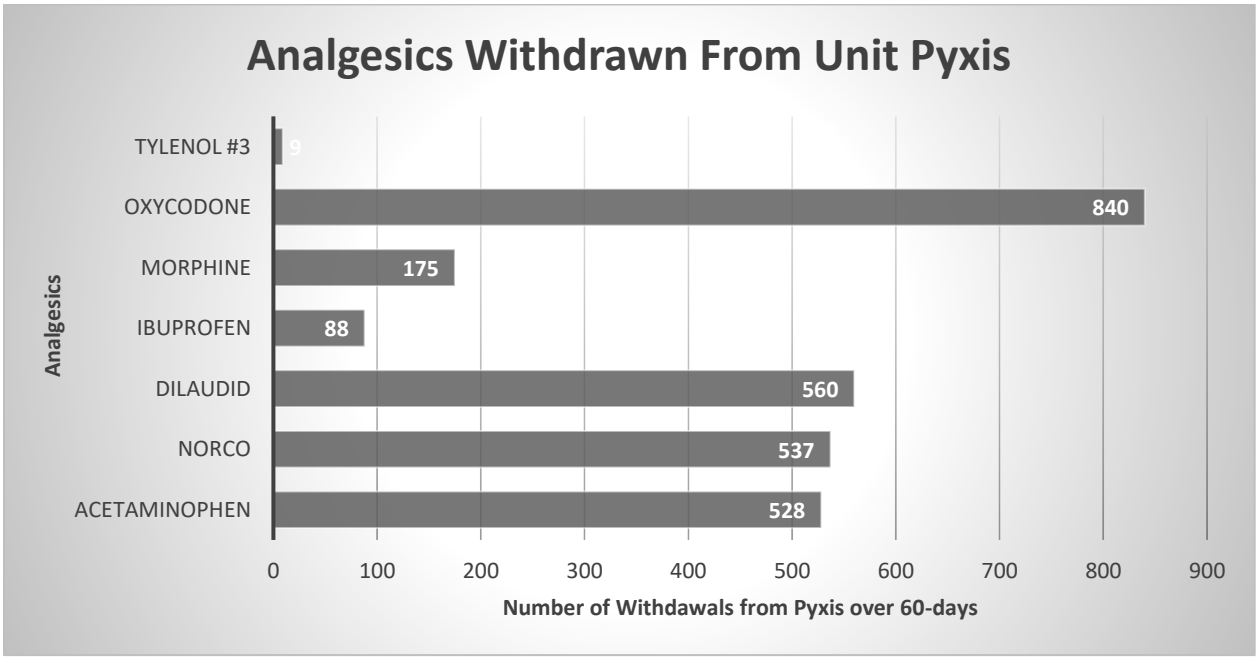



*Figure 2.* Over half of the sample population never received an analgesic that did not contain an opioid.

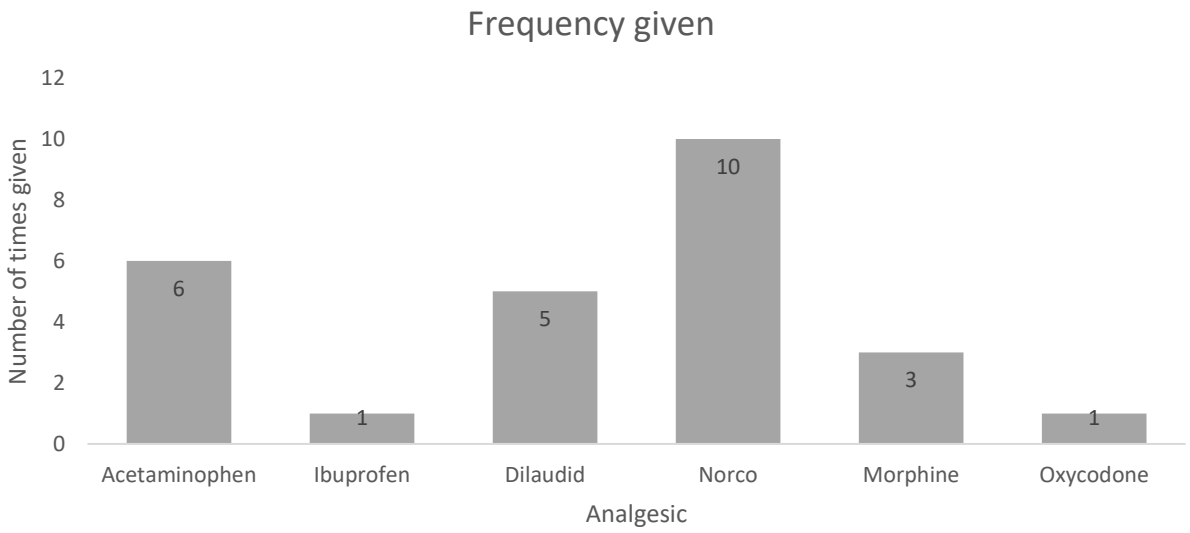



*Figure 3.* Analgesics given upon arrival to the unit.

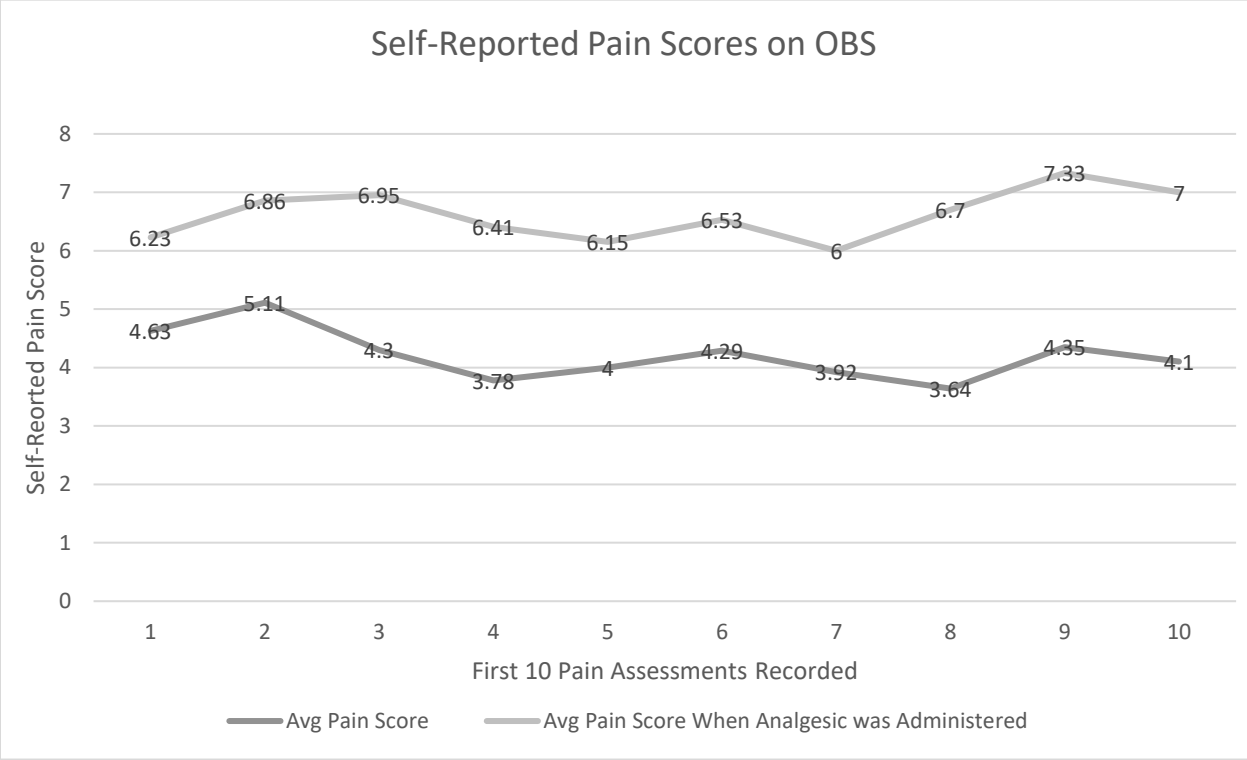



*Figure 4.* Average pain scores for the first ten pain assessments while on the unit compared with the average pain scores when an analgesic was administered.

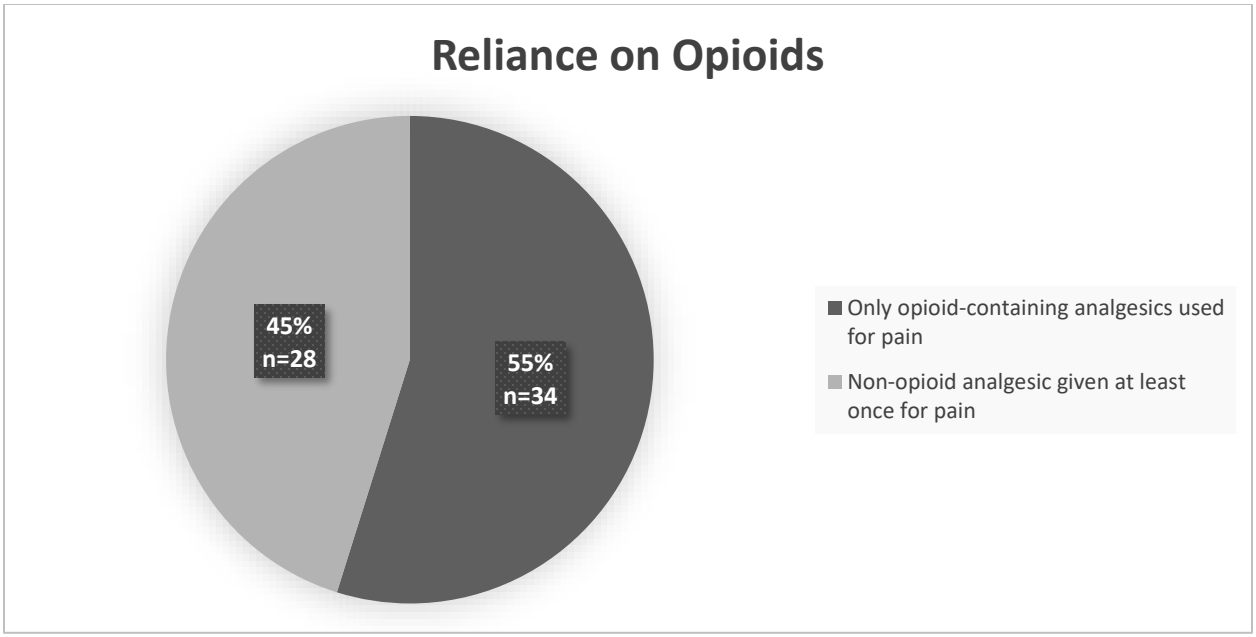



*Figure 5.* Over half of the sample population never received an analgesic that did not contain an opioid.

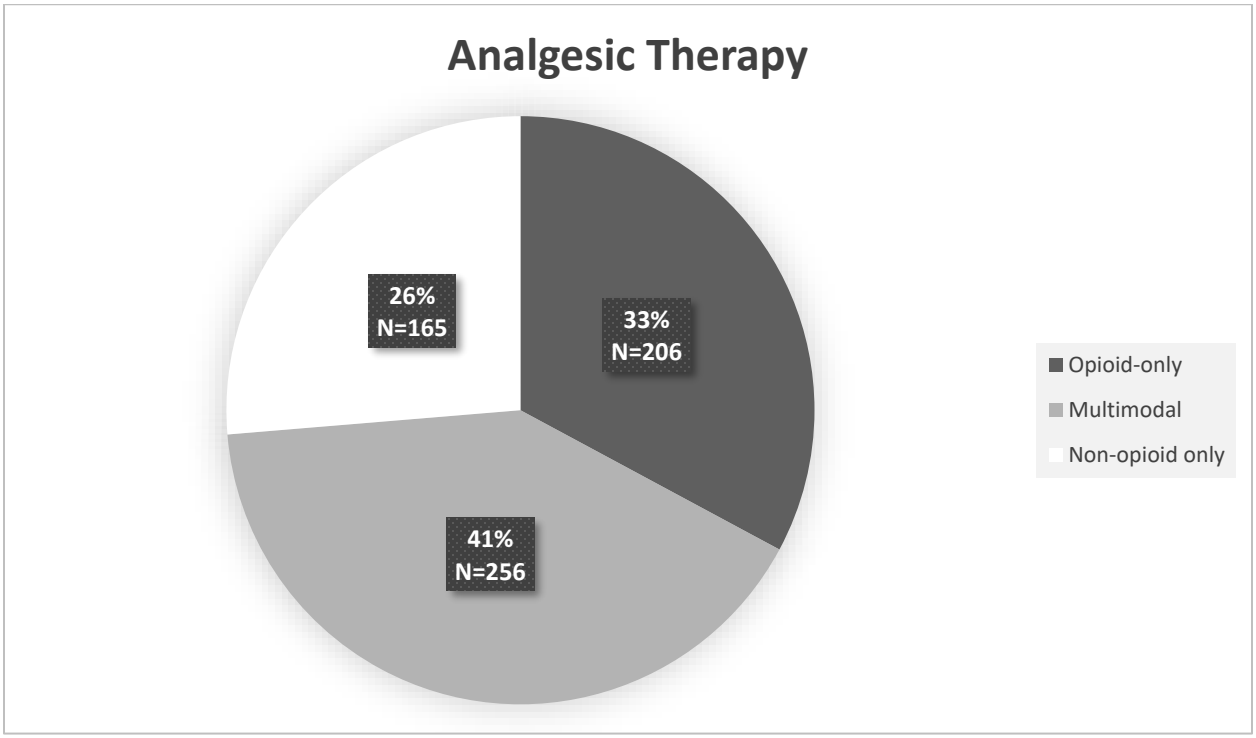
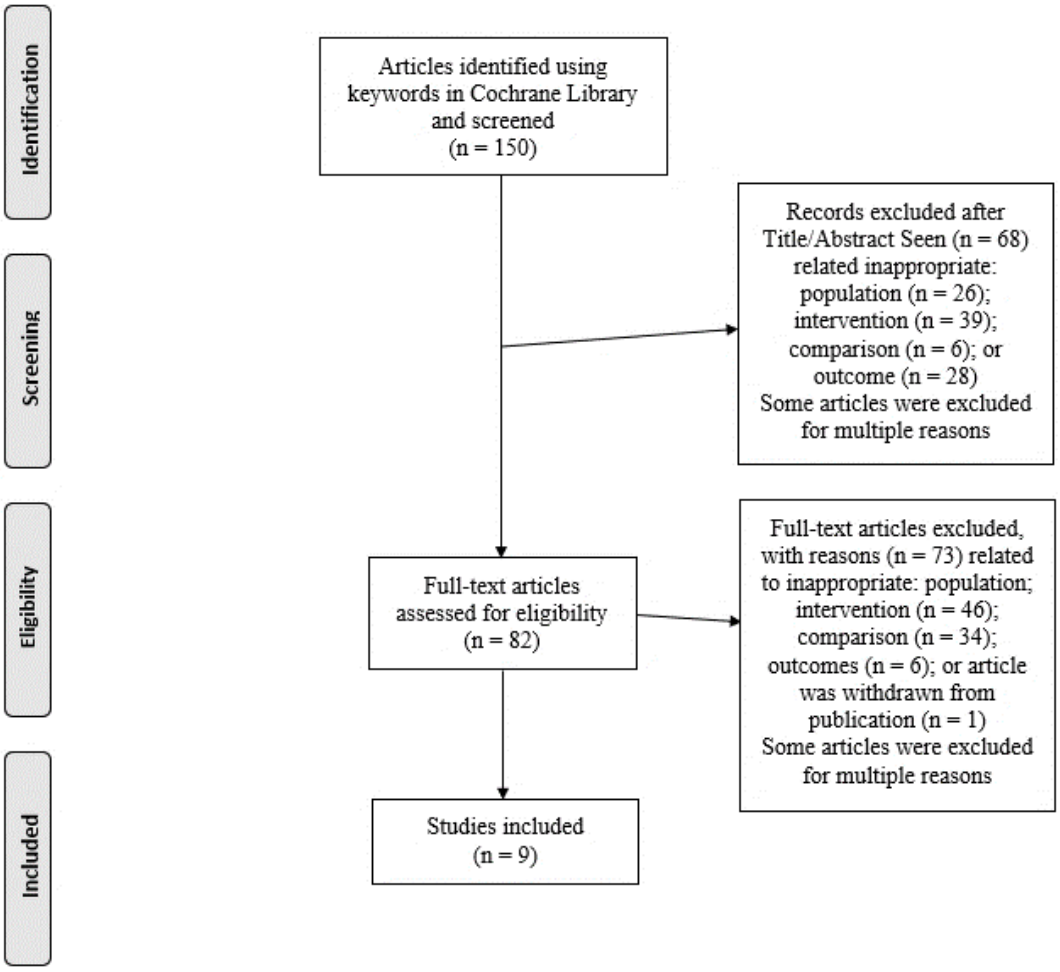



*Figure 6.* Breakdown of analgesic therapy used for treating 627 patients for pain on the unit over a 60-day period.

Appendix B

PRISMA Flow Diagram of Systematic Search




Adapted from "Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement," by D. Moher, A. Liberati, J. Tetzlaff, D. Altman, and PRISMA Group. Copyright 2009 by PLoS Medicine.

Appendix C

Table of Evidence

| Author (Year) Purpose | Design (N) | Inclusion Criteria | Intervention vs Comparison | Results | Conclusion |
|---|---|---|---|---|---|
| Ashfar (2015) Determine benefits and harms of use of NSAIDs and non-opioids to treat renal colic due to kidney stones | RCTs and Quasi-experimental RCTs (N = 3) | > 16 years with acute onset pain related to kidney stones (<48 hours) | Combination therapy to Monotherapy | *Efficacy:*<br>○ 2 studies found NSAID + antispasmodic (N = 153) produced a decrease in VAS score than NSAID alone (N = 157) (Mean Difference -1.99 [-2.58, -1.40]; p < 0.00001)<br>*Adverse Events:*<br>○ 1 study of found NSAID + Desmopressin (N = 22) produced less adverse events than Desmopressin alone (N = 20) (RR 0.14 [0.0, 0.54]; p-value not reported) | NSAIDs are effective in pain management of renal colic due to kidney stones; addition of antispasmodic to NSAIDs did reduce pain |
| Baily (2013) Beneficial and harm of combination acetaminophen and ibuprofen for pain after removal of wisdom teeth | Double-blind RCTs (N = 2) | All ages; removal of wisdom teeth; report of moderate to severe pain | Acetaminophen + Ibuprofen to Ibuprofen or Acetaminophen alone | *Efficacy:*<br>○ 1 study found 50% or greater pain reduction significantly more for the multimodal group (N = 67) than the individual group (N = 103) (RR 1.77 [1.32, 2.39]; p = 0.0002);<br>○ 1 study found 50% or greater pain reduction over 2 hours significantly more for the multimodal group (N = 67) than the individual group (N = 103) (RR 1.29 [0.91, 1.85]; p = 0.15)<br>○ 2 studies found rescue medication for pain relief was required more often in the individual group (N = 251) than the multimodal group (N = 216) (RR 1.60 [1.36, 1.88]; p < 0.00001) | Combination of Acetaminophen and Ibuprofen provided better relief for pain related to wisdom teeth extraction compared to either drug alone. |

| | | | | | |
|---|---|---|---|---|---|
| Chapparo (2012) Efficacy, tolerability, and safety of combination therapy for neuropathic pain | Double-blind RCTs (N = 2) | ≥ 18 years old with neuropathic pain | Anticonvulsant + opioid compared to anticonvulsant alone | *Efficacy:*<br>○ 2 studies found good/moderate pain relief for Anticonvulsant + Opioid (N = 210) compared to anticonvulsant alone (N = 213) (RR 1.30 [1.04, 1.161]; p = 0.02)<br>*Adverse Events:*<br>○ 2 studies found participants dropped out due to adverse events at a higher rate with anticonvulsant + opioid (N = 216) than anticonvulsant alone (N = 217) (RR 2.76 [1.47, 5.21]; p = 0.002) | Multimodal therapy is better for neuropathic pain than monotherapy but is associated with greater adverse events when combining opioid to anticonvulsant. |
| Derry (2013) Determine efficacy and adverse effects of ibuprofen with oxycodone for moderate to severe postoperative pain | Double-blind RCTs (N = 2) | > 15 years old with established moderate to severe pain (ex. VAS score > 30) | Ibuprofen + Oxycodone to Ibuprofen or Oxycodone alone | *Efficacy:*<br>○ 2 studies found 50% or greater pain reduction more with Ibuprofen 400mg + Oxycodone 5mg (N = 356) than Ibuprofen 400mg alone (N = 361) (RR 1.15 [1.00, 1.31]; p = 0.016)<br>○ 2 studies found 50% or greater pain reduction more with Ibuprofen 400mg + Oxycodone 5mg (N = 356) than Oxycodone 5mg alone (N = 115) (RR 2.46 [1.75, 3.46]; p < 0.00001)<br>○ 2 studies found less need for rescue medication within 6 hours with Ibuprofen 400mg + Oxycodone 5mg (N = 356) than Ibuprofen 400mg alone (N = 361) (RR 0.83 [0.72, 0.97]; p = 0.016)<br>○ 2 studies found less need for rescue medication within 6 hours with Ibuprofen 400mg + Oxycodone 5mg (N = 356) than Oxycodone 5mg alone (N = 115) (RR 0.53 [0.46, 0.72]; p < 0.00001)<br>*Adverse Events*: no differences | The combination of Ibuprofen and Oxycodone produced greater analgesia and less chance of needing additional analgesia within 6 hours without increasing adverse events compared to either drug alone. |

| | | | | | |
|---|---|---|---|---|---|
| Derry (2013a) Determine efficacy and adverse events for ibuprofen with acetaminophen for adults with acute postoperative pain compared to ibuprofen alone. | Double-blind RCTs (N = 2) | > 15 years old with moderate to severe pain (ex. VAS score > 30) | Ibuprofen + Acetaminophen to Ibuprofen | *Efficacy:*<br>○ 2 studies found ≥50% pain reduction with Ibuprofen 400mg + Acetaminophen 1000mg (N = 216) than Ibuprofen 400mg alone (N = 143) (RR 1.30 [1.10, 1.55]; p = 0.0028)<br>○ 2 studies found less need for rescue medication with Ibuprofen 400mg + Acetaminophen 1000mg (N = 216) than Ibuprofen 400mg alone (N = 143) (RR 0.57 [0.42, 0.77]; p = 0.00026)<br>*Adverse Events:*<br>○ 2 studies demonstrated fewer adverse events with Ibuprofen 400mg + Acetaminophen 1000mg (N = 216) than Ibuprofen 400mg alone (N = 143) (RR 0.81 [0.66, 0.99]; p = 0.038) | The combination of Ibuprofen with Acetaminophen is produces better and longer analgesia and less adverse events than Ibuprofen alone. |
| Derry (2016) Determine efficacy and adverse events of ibuprofen with codeine use on moderate to severe postoperative pain | Double blind RCTs (N=10) | > 15 years old with moderate to severe pain (ex. VAS score > 30) resulting from surgery | Acetaminophen + Codeine to Acetaminophen | *Efficacy:*<br>○ 4 studies found ≥50% pain reduction more with Acetaminophen 800-1000mg + Codeine 60mg (N = 153) than Acetaminophen 800-1000mg alone (N = 121) (RR 1.31 [1.06, 1.62]; p = 0.014)<br>○ 10 studies found ≥50% pain reduction with Acetaminophen 600-650 mg + Codeine 60 mg (N = 309) than Acetaminophen 600-650 mg alone (N = 313) (RR 1.30 [1.11, 1.52]; p = 0.0013)<br>○ 2 studies found need for rescue medication less often with Acetaminophen 800-1000 mg + Codeine 60 mg (N = 64) than Acetaminophen 800-1000 mg alone (N = 63) (RR 0.61 [0.41, 0.89]; p = 0.011) | Adding codeine to Acetaminophen results in greater and longer analgesia without increasing adverse events compared to Acetaminophen |

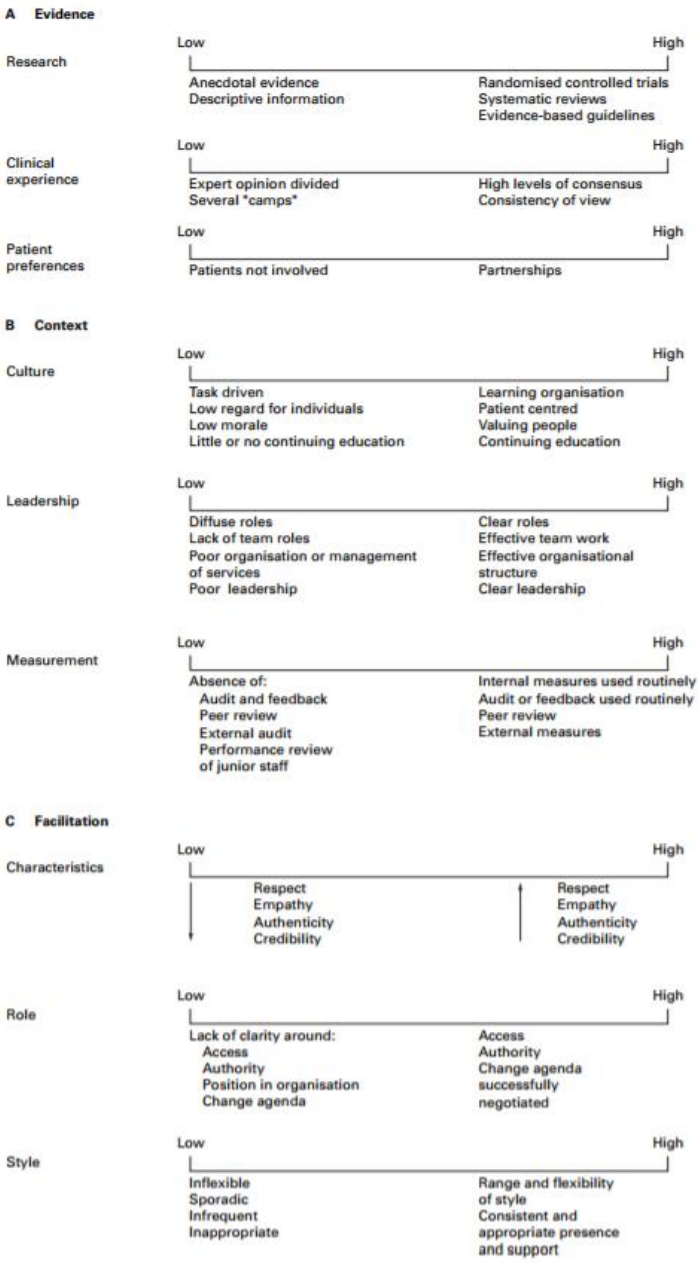
| | | | | | |
|---|---|---|---|---|---|
| | | | | ○ 7 studies found need for rescue medication significantly was less with Acetaminophen 600-650 mg + Codeine 60 mg (N = 216) than Acetaminophen 600-650 mg alone (N = 220) (RR 0.75 [0.64, 0.88]; p = 0.00037)<br>*Adverse Events:* no differences | |
| Moore (2015) Determine efficacy of oral analgesics for acute pain of at least moderate intensity after surgery | Double-blind RCTs (N = 161) | ≥ 15 years old with moderate to severe postoperative pain | Several single agents and combination therapies compared as a group | *Efficacy:*<br>• NNT for ≥ 50% pain relief over 4-6 hours<br>○ Acetaminophen 650mg (19 studies; N = 1886) NNT is 4.6 (3.9 to 5.5) and Acetaminophen 1000mg (28 studies; N = 3232) NNT 3.6 (3.2 to 4.1)<br>○ Codeine 60mg (17 studies; N = 1413) NNT is 3.9 (3.3 to 4.7)<br>○ Acetaminophen 650mg/Codeine 60mg (17 studies; N = 1413) NNT is 3.9 (3.3 to 4.7) and Acetaminophen 1000mg/Codeine 60mg (3 studies; N = 192) NNT is 2.2 (1.8 to 2.9)<br>○ Ibuprofen 400mg (51 studies; N = 5604) NNT is 2.1 (1.9 to 2.3) and Ibuprofen 600mg (3 studies; N = 203) NNT is 2.7 (2.0 to 4.2)<br>○ Ibuprofen 400mg/Codeine 26-60mg (4 studies; N = 443) NNT is 2.2 (1.8 to 2.6)<br>○ Ibuprofen 400mg/Acetaminophen 1000mg (3 studies; N = 543) NNT is 1.5 (1.4 to 1.7)<br>○ Ibuprofen 400mg/Oxycodone 5mg (3 studies; N = 603) NNT is 2.3 (2.0 to 2.8)<br>○ Oxycodone 15mg (3 studies; N = 228) NNT is 4.6 (2.9 to 11) | Oral analgesics produced good analgesia; combining two drugs resulted in good/long-lasting analgesia |

| | | | | | |
|---|---|---|---|---|---|
| | | | | ○ Tramadol 150mg (5 studies; N = 371) NNT is 2.4 (2.0 to 3.1)<br>○ Tramadol 75mg/Acetaminophen 650mg (5 studies; N = 659) NNT is 2.9 (2.5 to 3.5)<br>• Mean time needed to remedication (statistical details not provided in article)<br>○ Acetaminophen 650mg: 3.5 hours and Acetaminophen 1000mg: 4 hours<br>○ Codeine 60mg: 3 hours<br>○ Acetaminophen 650mg/Codeine 60mg: 4 hours<br>○ Acetaminophen 1000mg/Codeine 60mg: 5 hours<br>○ Ibuprofen 400mg: 6 hours<br>○ Ibuprofen 400mg/Acetaminophen 1000mg: 8.5 hours<br>○ Acetaminophen 1000mg/Oxycodone 10mg: 8.5 hours<br>○ Acetaminophen 650mg/Oxycodone 10mg: 9.5 hours | |
| Ramiro (2011) Determine benefits and safety of combination therapy for inflammatory arthritis | RCTs and Quasi-randomized controlled clinical trials (N=18) | ≥18 years with inflammatory arthritis | At least 2 drugs: Acetaminophen, Opioids, NSAIDs, and Neuromodulators to monotherapy with one of the drugs | *Efficacy:*<br>○ 2 studies found combination therapy reduces pain better compared to monotherapy;<br>○ 1 study found high dose NSAID was significantly better than low dose combination therapy<br>○ 15 studies found no difference<br>*Adverse Events:*<br>○ 1 study found monotherapy had significantly more study withdrawals compared to combination therapy; 7 studies found no difference | Evidence is limited to conclude combination therapy is better for inflammatory arthritis pain than monotherapy |

| | | | | | |
|---|---|---|---|---|---|
| | | | | ○ 1 study found combination therapy had more adverse events than monotherapy; 9 studies found no difference | |
| Toms (2009) Determine efficacy and adverse events of Acetaminophen with codeine for acute postoperative pain compared to acetaminophen alone | Double blind RCTs (N = 14) | > 15 years old with moderate to severe pain (ex. VAS score > 30) resulting from surgery | Acetaminophen + Codeine to Acetaminophen | *Efficacy:*<br>○ 4 studies demonstrated ≥50% pain reduction more with + Acetaminophen 800-1000mg + Codeine 60mg (N = 153) than Acetaminophen 800-1000mg alone (N = 121) (RR 1.31 [1.06, 1.62]; p = 0.014)<br>○ 10 studies found ≥50% pain reduction with Acetaminophen 600-650 mg + Codeine 60 mg (N = 309) than Acetaminophen 600-650 mg alone (N = 313) (RR 1.30 [1.11, 1.52]; p = 0.0013)<br>• 2 studies demonstrated need for rescue medication less often with Acetaminophen 800-1000 mg + Codeine 60 mg (N = 64) than Acetaminophen 800-1000 mg alone (N = 63) (RR 0.61 [0.41, 0.89]; p = 0.011)<br>• 7 studies found need for rescue medication was less with Acetaminophen 600-650 mg + Codeine 60 mg (N = 216) than Acetaminophen 600-650 mg alone (N = 220) (RR 0.75 [0.64, 0.88]; p = 0.00037)<br>• *Adverse Events:* no difference | Adding Codeine to Acetaminophen results in greater and longer analgesia without increasing adverse events compared to Acetaminophen alone |

Appendix D

PARiHS Continua of Dimensions




Adapted from "Enabling the implementation of evidence based practice: a conceptual framework," by A. Kitson, G. Harvey, and B. McCormack. Copyright 1998 by Quality and Safety in Health Care.

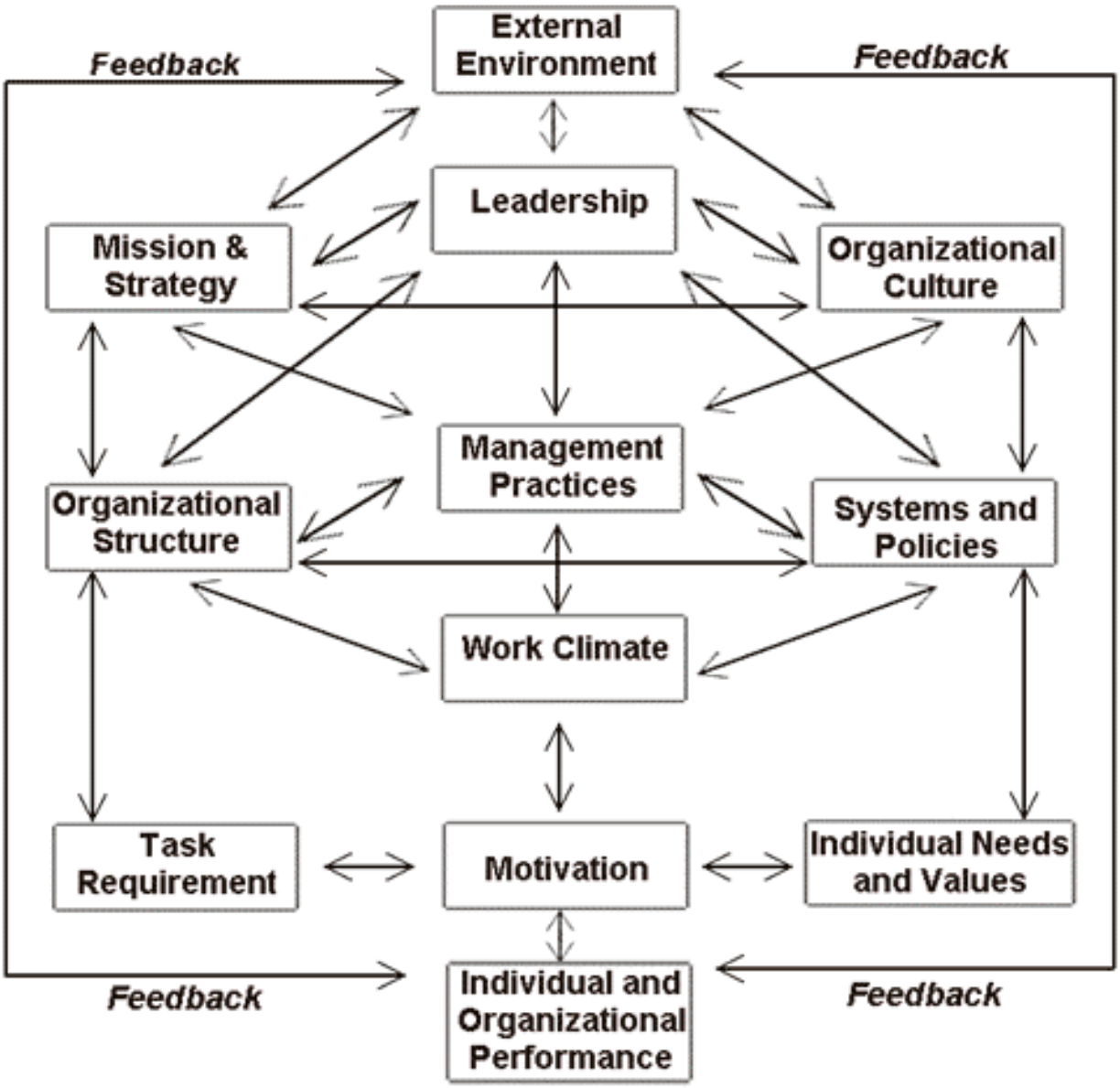
Appendix E

Kotter's Eight Step Change Model


Adapted from "Kotter's 8-Step Process", by J. Kotter. Copyright 2017 by Kotter International

Appendix F

Burke-Litwin Causal Model




Adapted from "A Causal Model of Organizational Performance and Change," by W. W. Burke and G. H. Litwin, 1992, *Journal of Management, 18,* 528. Copyright 1992 by Southern Management Association.

Appendix G

SWOT Analysis of the OBS Unit

| | |
|---|---|
| **Strengths**<br>• Closed-unit: Staff does not float between units; thus, staff on the OBS unit are consistent<br>• Only one provider group (ECS) consistently admits patients to the OBS unit<br>• Inpatient pharmacy has a variety of analgesics on formulary<br>• Part of SH, which is a top 15 health care system that promotes care improvement initiatives<br>• Motivated leaders, management, and staff that support process improvements<br>• Low staff turnover | **Weaknesses**<br>• Short average patient length of stay (18hrs); finding a correct pain management regimen takes time<br>• Current EHR analgesic orders limit which analgesic can be given based on patient's pain rating and description<br>• Patients in pain is caused by a variety of reasons; it will be difficult to create a generic protocol<br>• New EHR (Epic) being implemented in November 2017; staff preoccupied learning new system |
| **Opportunities**<br>• Public attention on the opioid crisis; SH is prime to champion innovative opioid reduction campaigns<br>• Decreased ED visits and hospitalizations of people with opioid misuse and overdose by preventing future opioid dependence<br>• Enhance quality of care by integrating evidence-based care<br>• Decrease unit's contribution to the opioid crisis | **Threats**<br>• Pain management related questions on patient surveys that are tied to reimbursement<br>• Patients unaccepting of decreased emphasis on opioid use<br>• Staff that does not "buy-in" to the practice change |

Appendix H

**Rethinking Pain Management**
**Quality Improvement Project: Multimodal Pain Management on the Observation Unit**

**To: Observation Unit Providers**
**From: Katie Ellens, BSN, RN**

**Purpose:** I am conducting a quality improvement project as part of my Doctor of Nursing Practice (DNP) degree. The purpose of a DNP project is to examine current practice and evidence to identify areas that need improvement. For the past 6 months, I have been investigating our current pain management practices and want to share this with you. First, all providers are doing an exceptional job of ordering a variety of pain medications. But I have found some intriguing evidence about **multimodal pain management** that could make our pain management practices more effective that I am sharing with the RNs. I want to inform you also in order to promote *interprofessional collaboration*.

**Significance**

- The US is 4% of the world population; yet, consumes **80%** of the world's supply of opioids[1]
- Despite increasing opioid Rx **400%** since 1999, the number of people reporting pain has not decreased[2]
- Opioids are not as useful for pain as commonly believed, in fact, opioids are only *modestly* better than placebo, and no better than NSAIDs at relieving pain[3]

**Current Practice on the Observation Unit**

- **75%** of analgesics used are opioids
- 1 in 3 patients exclusively receive opioids for pain
- **25%** of patients treated for pain *only* had opioid pain medications ordered
- Of those with an acetaminophen or ibuprofen order, **40%** were still given *only opioids*

**1 in 3**

**patients exclusively receive opioids for pain**

***did include patients who received Norco, as it is multimodal***

**Evidence**

The following is the number needed to treat (NNT) to produce ≥ 50% reduction in pain in 1 person[4]:
(NNT = how many people must be treated for **1** person to get the desired response)

Single Agent Treatment

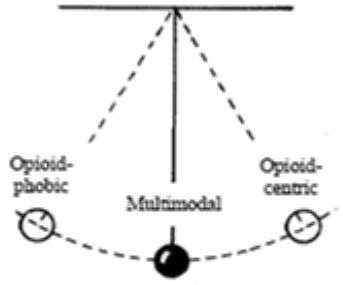
- Oxycodone 15mg NNT is 4.6
- Acetaminophen 650mg NNT is 4.6
- Acetaminophen 1000mg NNT is 3.6
- Ibuprofen 600 NNT is 2.7

Combination Treatment

- Oxycodone 10mg + Acetaminophen 650mg NNT is 2.7
- Oxycodone 5mg + Ibuprofen 400mg NNT is 2.3
- Ibuprofen 400mg + Acetaminophen 1000mg NNT is **1.5**

Evidence demonstrates **multimodal** produces more effective pain management while reducing the dose of oxycodone required for *BETTER* analgesia. In fact, the *most effective* combination is ibuprofen + acetaminophen.

**Considerations:** Although evidence demonstrates opioids are not as effective for pain as commonly believed, opioids do have a *strong* psychotherapeutic effect making them useful for treating the *emotional distress* of pain[5]. Opioids play an important role in **acute pain** and are made more effective by adding acetaminophen and NSAIDs.




**Recommendations**

- Please continue to order a variety of pain medications so multimodal pain management can be delivered
- Consider ordering BOTH acetaminophen and NSAIDs when *appropriate**, as together they produce effective pain relief
- Discuss the benefits of a multimodal pain management strategy with patients upon admission for increased patient buy-in

**Goal:** Make multimodal pain management the standard of care → decrease number of patients who receive exclusively opioids for pain from 31% to 15%

~Watch for weekly progress reports on this QI project in your email starting in December~

*It is understandable that NSAIDs and acetaminophen are not always appropriate, please consider them if they are*

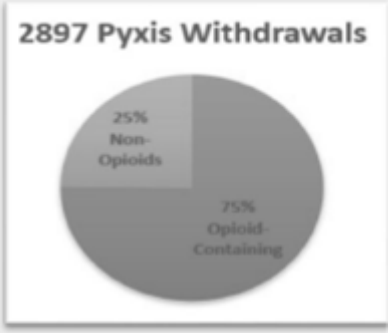
Appendix I

Educations Flyer

**Rethinking Pain Management**


Did you know: Acetaminophen and ibuprofen given **together** can produce *better pain relief* than up to 15mg of oxycodone given alone?[1]

While opioids have a strong psychotherapeutic effect making them useful for treating the emotional distress of pain, they not as powerful at relieving pain as commonly believed. In fact, they are only modestly better than placebo at relieving pain, and no better than NSAIDs.[2] Thus, they have a role in acute pain management and can be made **significantly more effective** by co-administering them with acetaminophen and NSAID when appropriate.[3-7]




**Current Practice on the Observation Unit**

- **75%** of the analgesics used are opioids
- 1 in 3 patients receive exclusively opioids for pain
- **25%** of patients treated for pain had *only* opioid pain medications ordered
- Of those with an acetaminophen or ibuprofen order, **40%** were still given *only opioids*

**New Evidence**

The following is the number needed to treat (NNT) to produce ≥ 50% reduction in pain in 1 person[1]:

(NNT = how many people must be treated for 1 person to get the desired response; the closer to 1, the better the med)

Single Agent

- Oxycodone 15mg NNT is 4.6
- Acetaminophen 650mg NNT is 4.6
- Acetaminophen 1000mg NNT is 3.6
- Ibuprofen 600mg NNT is 2.7
- Ibuprofen 400mg NNT is 2.1*

Combination

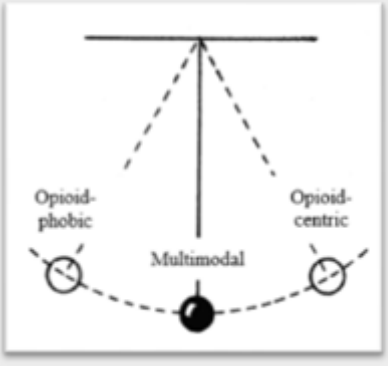
- Oxycodone 10mg + Acetaminophen 650mg NNT is 2.7
- Oxycodone 5mg + Ibuprofen 400mg NNT is 2.3
- Ibuprofen 400mg+ Acetaminophen 1000mg NNT is 1.5

AND

Evidence demonstrates **multimodal** produces more effective pain management while reducing the dose of oxycodone required for *BETTER* analgesia. In fact, the *most effective* combination is ibuprofen + acetaminophen

**Recommendations**

- Order and deliver a variety of pain medications as *appropriate*
- Inform patients of the benefits of **multimodal** pain management
- If an NSAID is *appropriate*, use it! Evidence suggests NSAIDs are some of the most effective pain relievers available
- It is okay if different pain medications are not given at the SAME time, the idea is to have multiple medications at therapeutic levels simultaneously and it is not always possible to give them together due to each medications dosing frequency[8]


**Goal**

• Make **multimodal** pain management the *standard of care* whenever opioids are used

→ decrease number of patients who receive exclusively opioids for pain from 31% to 15%

**Next Steps**

• Watch for weekly progress reports starting in December

• A request to modify the indication of ibuprofen and acetaminophen from mild pain (1-3) to all pain severity (1-10) will be submitted

Multimodal pain management has the potential to produce better pain relief for our patients while reducing out reliance on opioids.

Appendix J

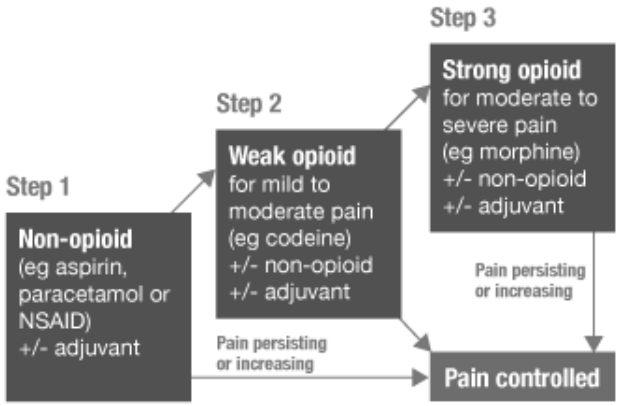
Proposal for Order Set Modification

**To: Subject Matter Experts**
**From: Katie Ellens, BSN, RN**

**SBAR: Making the case to change the indication for acetaminophen and ibuprofen on the Observation Unit Order Set**

**Situation:**
1 in 3 patients receive exclusively opioids for the treatment of pain on the Observation unit

**Background:**
Evidence tells us opioids are modestly better than placebo at treating pain and *no better* than an NSAID (Kalso, Edwards, Moore, & McQuay, 2004). Yet, we continue to use opioids for moderate to severe pain while limiting the use of acetaminophen and ibuprofen. This way of thinking parallels the World Health Organization (WHO) Pain Ladder. The WHO pain ladder was created in 1986 as a reference to clinicians on how to treat cancer pain (Teater, 2014). Many providers still reference this framework today to guide effective treatment of pain. Unfortunately, however, these recommendations were based on expert opinion, not on evidence (Vargas. Instead, evidence shows us that a **multimodal approach** (a synergistic method using 2 or more analgesics with *different* mechanisms of action) to treating pain is significantly more effective at achieving a ≥50% reduction in pain and increasing time to remedication for pain (Bailey et al., 2013; Derry, Derry, & Moore, 2013; Derry et al., 2013a; Gaskell et al., 2009; Toms et al., 2009).




Consider the number needed to treat (NNT) statistical measure when comparing the effectiveness of pain medications (NNT = how many people must be treated to produce a ≥50% reduction in pain in **1** person) (Moore, Derry, McQuay, & Wiffen, 201):

Single Agent Treatment

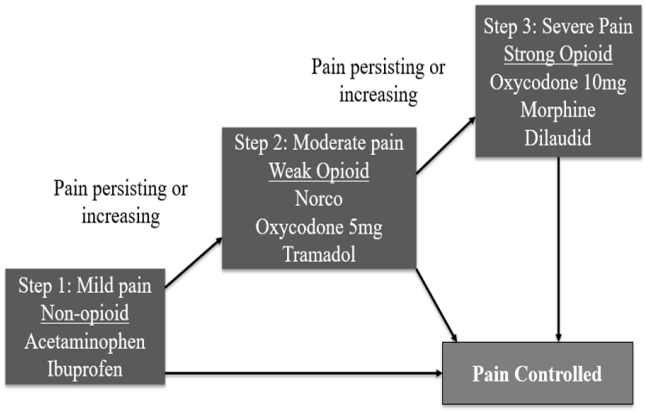
- Oxycodone 15mg NNT is 4.6
- Acetaminophen 650mg NNT is 4.6
- Acetaminophen 1000mg NNT is 3.6
- Ibuprofen 600mg NNT is 2.7

Multimodal Treatment

- Oxycodone 10mg + Acetaminophen 650mg NNT is 2.7
- Oxycodone 5mg + Ibuprofen 400mg NNT is 2.3
- Ibuprofen 400mg + Acetaminophen 1000mg NNT is 1.5

Evidence demonstrates multimodal treatment produces more effective pain management while reducing the dose of oxycodone required for better analgesia. In fact, the most effective combination is ibuprofen + acetaminophen. Despite evidence demonstrating opioids are not as effective as commonly believed, we do know, that opioids have a strong psychotherapeutic effect that help relieve the emotional distress of pain (Teater, 2014). This makes opioids useful for treating acute pain.

**Assessment:**




Although evidence clearly shows us that co-administering acetaminophen or an NSAID with an opioid produces more effective pain relief than when administering an opioid in isolation, our orders sets are preventing this from happening. The indication for ibuprofen and acetaminophen are currently for "mild pain (1-3) or per patient description". The RN could conceivably give ibuprofen for acetaminophen or ibuprofen for a pain score of any number as long as the patient describes the pain as mild. However, the order would restrict the RN from administering ibuprofen or acetaminophen WITH an opioid (ie oxycodone) because oxycodone is generally ordered for moderate to severe pain. If the RN were to ignore the indications and administer evidence-based pain management, the RN would be practicing outside of his or her scope of practice according to the Joint Commission. Interestingly, the current Observation Order set features pain medications orders in a similar fashion to the WHO pain ladder.

**Recommendation:**

Change the indication for acetaminophen and ibuprofen from "mild pain (1-3) or patient description" to **"for pain (1-10), may co-administer with an opioid for moderate to severe pain (4-10)"**. This indication allows for acetaminophen and ibuprofen to be used as a multimodal approach for all pain levels. It gives clear direction on when it is appropriate, and when it can be co-administered with an opioid. This indication has been used in another hospital organization in order to promote more multimodal pain management.

Appendix K

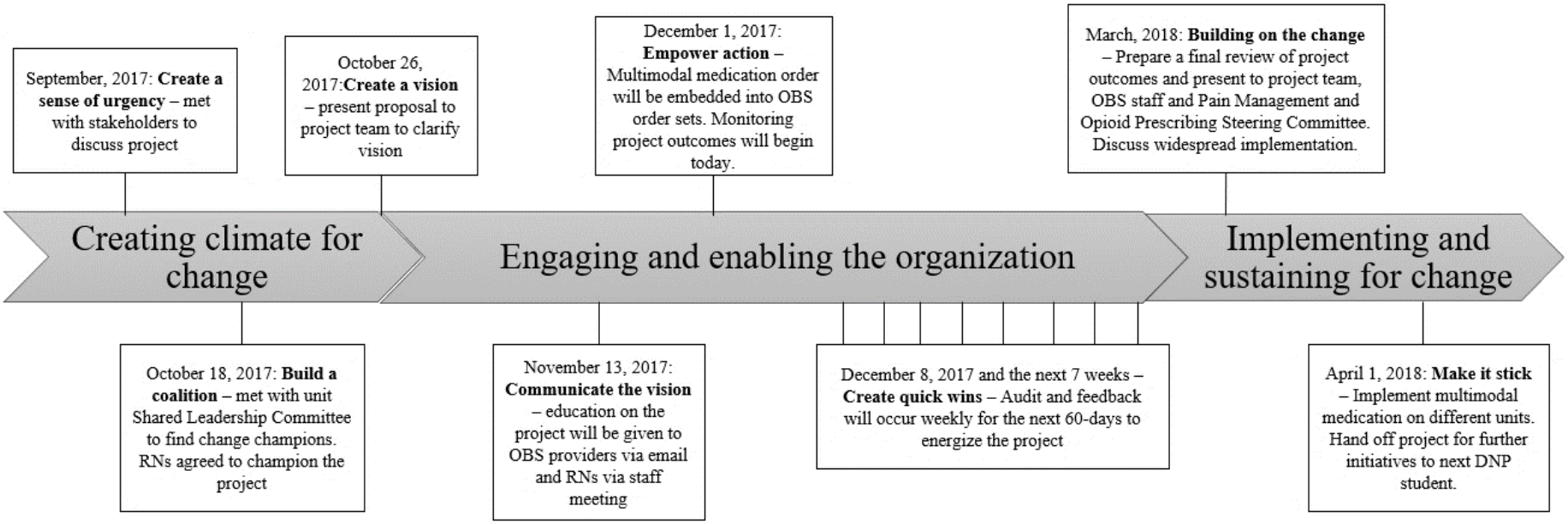
Sample Pre/Post Survey

1. True or **False**: Opioids are the best treatment for pain
2. Which of the following pain management options has been found to produce the best pain relief:
    a. Oxycodone 15mg
    b. Ibuprofen 800mg
    c. Oxycodone 5mg/Ibuprofen 400mg
    **d. Acetaminophen 1000mg/Ibuprofen 400mg**
3. **True** or False: Opioids, acetaminophen, and NSAIDs have different mechanisms of action that results in pain relief
4. On the Observation unit, how many patients receive ONLY opioids to manage their pain while on the unit?
    **a. 1 in 3 patients**
    b. 1 in 4 patients
    c. 1 in 5 patients
    d. 1 in 6 patients
5. **True** or false: When more than one analgesic is used to treat pain, the same level of pain relief may be achieved with a lower dose of each analgesic.

Question 5) Wells, N., Pasero, C., & McCaffery, M. (2008). Improving the quality of care through pain assessment and management. In R. G. Hughes (Ed.), *Patient safety and quality: An evidence-based handbook for nurses*. Rockville, MD: Agency for Healthcare Research and Quality.

Appendix L

Timeline for Implementation



# Appendix M

## GVSU IRB Determination

GRAND VALLEY STATE UNIVERSITY
www.gvsu.edu

| | |
|---|---|
| DATE: | June 5, 2017 |
| TO: | Sandra Spoelstra, PhD, RN |
| FROM: | Grand Valley State University Human Research Review Committee |
| STUDY TITLE: | [1081127-1] Implementation of an Evidence-Based Opioid Reduction Pain Management Protocol for an Observation Unit |
| REFERENCE #: | 17-241-H |
| SUBMISSION TYPE: | New Project |
| ACTION: | RESEARCH - NOT HSR |
| EFFECTIVE DATE: | June 5, 2017 |
| REVIEW TYPE: | Administrative Review |

Thank you for your submission of materials for your planned research study. Upon review of the aims and description of your study, it has been determined that this project *DOES NOT* meet the definition of covered human subjects research* according to current federal regulations. The project, therefore, *DOES NOT* require further review and approval by the HRRC.

According to your study description, you are conducting a study to decerase unnecessary use of opiates. While your study does include human subjects and a sytematic approach, its intent is not to develop or contribute to generalizable knowledge, which therefore *does not meet* the federal definition of research as stated in 45 CFR 46.102 (d) Research - a systematic investigation, including research development, testing and evaluation, **designed to contribute to generalizable knowledge**.

Should you change the aims and activities of your project such that it would then meet the definition of human subjects research, please cease any contacts with potential human subjects until such time as you submit the project protocol to the HRRC and receive the committee's approval to proceed. Should you change the aims and activities of your project such that you are unsure if it meets the definition of human subjects research, please submit a new Non-Human Research Determination Form for review by the Office of Research Compliance and Integrity.

If you have any questions, please contact the Office of Research Integrity and Compliance at (616) 331-3197 or rci@gvsu.edu. Please include your study title and reference number in all correspondence with our office.

Respectfully,

Office of Research Compliance and Integrity

# Appendix N

## Organization IRB Determination

NON HUMAN RESEARCH DETERMINATION

June 15, 2017

Kathryn Ellens

PROTOCOL TITLE: **Implementation of an Evidence-Based Opioid Reduction Pain Management Protocol for an Observation Unit**

Dear Ms. Ellens,

On June 15, 2017, the above referenced project was reviewed. It was determined that the proposed activity does not meet the definition of research as defined by DHHS or FDA.

Therefore, approval by IRB is not required. This determination applies only to the activities described in the IRB submission and does not apply if changes are made. If changes are made and there are questions about whether these activities are research involving human subjects, please submit a new request to the IRB for a determination.

A quality improvement project may seek publication. Intent to publish alone is insufficient criterion for determining whether a quality improvement activity involves human subject research. However, please be aware when presenting or publishing the collected data that it is presented as a quality improvement project and not as research.

Please be advised, this determination letter is limited to IRB review. It is your responsibility to ensure all necessary institutional permissions are obtained prior to beginning this project. This includes, but is not limited to, ensuring all contracts have been executed, any necessary Data Use Agreements and Material Transfer Agreements have been signed, documentation of support from the Department Chief has been obtained, and any other outstanding items are completed (i.e. CMS device coverage approval letters, material shipment arrangements, etc.).

Your project will remain on file with the Office of the IRB, but only for purposes of tracking research efforts within the If you should have questions regarding the status of your project, please contact the Office of the IRB at

Sincerely,

Page 1 of 1

Appendix O

Budget for DNP Project

| **Initial Cost: Evidence-based Pain Management** | |
|---|---|
| **Transitioning focus from opioids to multimodal analgesia for pain management** | |
| | |
| **Revenue** | |
| Project Manager Time (in-kind donation) | 2,820.00 |
| Team Member Time: | |
| Statistician (in-kind donation) | 100.00 |
| Presidential Research Grant: White Paper for organization, educational flyers, binder to leave on unit for next step | 114.80 |
| Cost mitigation (Prevention of 1 hospitalization and 1 ED visit related to opioid overdose per year) | |
| 3.8-day Hospitalization (1-year period) | 29,497.00 |
| Emergency department visit (1-year period) | 3,640.00 |
| **TOTAL INCOME** | 36,171.80 |
| | |
| **Expenses** | |
| Project Manager Time (in-kind donation) | 2,820.00 |
| Statistician (in-kind donation) | 100.00 |
| Color-printed Educational Flyers | 82.80 |
| Professionally Printed White Paper | 25.00 |
| Binder with steps for sustainability | 7.00 |
| Team Member Time: | |
| Registered Nurses (extra time spent in staff meeting to be educated on pilot project) | 225.00 |
| Educate NPs and PAs (time spent reading education on pilot project) | 490.00 |
| Educate Physicians (time spent reading education on pilot project) | 655.00 |
| Pharmacist Consultation (one-time cost occurrence) | 60.00 |
| Clinical Nurse Specialist Consultation (one-time cost occurrence) | 96.00 |
| Pharmacy Technician generating weekly report (8-time occurrence) | 128.00 |
| **TOTAL EXPENSES** | 4,688.80 |

**OPERATING INCOME** 31,483.00

# Appendix P

## Letter of Support for Organization Advisor

5/22/2017

Regarding: Permission to Conduct DNP Project on the
Observation Unit

Dear Sir/Madam,

Kathryn Ellens is a Doctor of Nursing Practice (DNP) student at Grand Valley State University. As part of her DNP studies, she will be conducting a project on the
Observation unit. This project entails assessing the current pain management practices used on the unit and identifying gaps between evidence-based care and current practice. An evidence-based pain management protocol from literature will then be utilized to reduce opioid use on the unit.

I will serve as a mentor for Kathryn Ellens in relation to this project. I allow this student to conduct her project on this unit.

Sincerely,

# DNP Project Results

**JOURNAL OF DOCTORAL OF NURSING PRACTICE**
**Title Page**

**Title**: Effect on Opioid Use following the Implementation of Evidence-Based Pain Management Practices for an Observation Unit

**Author Name and Academic Degree:** Kathryn Ellens, BSN, RN

**Author Primary Affiliation:** Kirkhof College of Nursing, Grand Valley State University

**Corresponding Author:** Sandra Spoelstra, PhD., RN; Marie VanderKooi, DNP, RN; Petra Rotzell, MSN, RN

**Name:** Kathryn Ellens

**Address:** 2328 Sugar Pine Ct. Jenison MI, 49428

**Email:** ellenskatie@gmail.com

**Phone:** 616-581-9278

**Acknowledgements/credits and Sources of Funding:** The Grand Valley State University Presidential Research Grant

**Permission(s) for Previously Published Materials:** Not Applicable

**Disclosures/disclaimers:** All authors indicate no conflict of interest or competing interests.

## Structured Abstract

**Background:** Pain is the most common reason people seek healthcare. Recent opioid-centric practice has led to a 400% increase in opioid prescriptions without reducing the prevalence or intensity of pain. Consequently, an opioid crisis has ensued with devastating effects.

**Objectives:** To provide pain relief while reducing opioid use with evidence-based multimodal analgesia in an Emergency Department Observation Unit.

**Methods:** Quality improvement project to establish multimodal analgesia as the standard of care. Data on analgesic use and pain levels were gathered pre-/post-implementation and compared.

**Results:** Multimodal analgesia delivery increased ($p < .0001$) and pain level scores ($p = 0.022$) declined. Opioid consumption among high opioid utilizers ($p < 0.0001$) were decreased post-implementation. Reliance on opioid analgesics to treat pain were reduced ($p < .0001$). However, patient satisfaction regarding pain control ($p = 0.0018$) declined.

**Conclusions:** Multimodal analgesia can provide effective pain relief in certain settings while reducing opioid-reliance and consumption.

**Implications:** Multimodal analgesia is a simple technique that could reduce the perpetuation of the opioid crisis in certain settings. Further study is needed in multiple settings.

**Keywords:** Multimodal Analgesia, Pain Management, Acute Nociceptive Pain, Opioid Crisis

## Introduction

Pain is the most common reason people seek healthcare in the United States (US) (National Institutes of Health, 2013). Consequently, healthcare providers are under enormous pressure to provide pain relief. Initiatives, such as the American Pain Society "Pain as the fifth vital sign" (1996) and the Joint Commission Pain Management Standards (2001), set the stage for aggressive pain management. Opioids were increasingly utilized to address pain complaints as evidenced by the 400% increase in opioid prescriptions since 1999 (Paulozzi, Jones, Mack, & Rudd, 2011). Despite increased reliance on opioids for pain over the two decades, self-reported pain prevalence remains unchanged and the intensity of reported pain appears to be increasing (Centers for Disease Control and Prevention, CDC, 2016; Chang, Daubresse, Kruszewski, & Alexander, 2014).

Increased use of opioids did not have the intended effect on pain. Instead, it has resulted in devastating consequences termed the "opioid crisis". Research has shown opioid use for acute pain is associated with long-term opioid use (Shah, Hayes, & Martin, 2017). Nearly 25% of individuals who used opioids long-term struggle with addition (Boscarino et al., 2010). In 2011, approximately 1.5 million people were treated in emergency departments (EDs) for prescription drug misuse, three-times the rate in 2004 (Substance Abuse and Mental Health Services Administration, SAMHSA, 2013). Additionally, there has been an annual increase in opioid-related deaths, a 300% increase in reported opioid abuse, and a fourfold increase in substance abuse related admissions (SAMHSA, 2010).

The popular view that opioids are the strongest painkiller available persists; however, this notion is not supported by evidence (Teeter, 2014). Opioids are modestly effective at relieving pain compared to a placebo and no more effective than nonsteroidal anti-inflammatory drugs

(NSAIDs) (Kalso, Edwards, Moore, & McQuay, 2004). Notwithstanding evidence, the belief remains that opioids should be the standard of care for severe pain. A majority of family physicians believe opioids are the standard of care for acute pain (66%) and chronic pain (56%); and 56% indicate patient expectations factor into their decision to prescribe opioids (Onishi et al., 2017). Although lacking evidence to presume opioids should be the standard of care for pain, notably opioids exert a psychotherapeutic effect which may help relieve the emotional distress of pain (Teater, 2014). As a result, opioids remain useful, particularly for acute pain. However, a more balanced approach may be required to address the opioid crisis.

An alternative to overreliance on opioids for pain is multimodal analgesia. Multimodal analgesia combines two or more analgesics with different mechanisms of action to produce a synergistic effect on pain relief (Young & Buvanendran, 2012). The premise of multimodal analgesia is alteration in the pain signal along multiple sites of the pain pathway within the peripheral and central nervous system, leading to additive pain relief, while permitting smaller doses of each analgesic (White, 2017). Multimodal analgesia has been recommended by several professional organizations (Cantrill et al., 2012; American Society of Anesthesiologists Task Force, 2012; The Joint Commission, 2012; Thorson et al., 2014). Multimodal analgesia with opioids, acetaminophen, and NSAIDS is an evidence-based approach that provided more effective and efficient acute nociceptive pain relief with no increased adverse effects when compared to single agent therapy (Baily et al., 2013; Derry, S., Derry, C. J., & Moore, 2013; Derry, Derry, & Moore, 2013a; Derry, S., Karlin, S. M., & Moore, 2015; Toms, Derry, Moore, & McQuay, 2009). Furthermore, multimodal analgesia demonstrated opioid-sparing effect (Moore, Derry, McQuay, & Wiffen, 2015).

Evidence supports multimodal analgesia for pain relief, yet uptake of this practice is not occurring and the opioid crisis persists. Opioid prescriptions following ambulatory pain visits doubled from 2000 to 2010, while non-opioid analgesic prescriptions declined 25% (Daubresse et al., 2013). Furthermore, 236 million opioid prescriptions were dispensed in 2016 – enough for nearly every adult in the US (Pezalla, Rosen, Erensen, Haddox, & Mayne, 2017). Acute care settings demonstrate similar opioid-centric practices. Pharmacological pain treatment in EDs increased 25% from 2000 to 2010 while non-opioid analgesia declined 25% (Chang, et al., 2014). These trends indicate pain is treated aggressively with opioids, while non-opioid analgesia is underutilized.

## Organizational Assessment

An assessment of a hospital ED Observation unit (OBU) located in the Midwest identified similar pain management trends. The OBU serves patients experiencing acute nociceptive pain, with the most common diagnoses being renal colic/nephrolithiasis, back pain, cellulitis, musculoskeletal injuries, and dental infections.

The Burke-Litwin Causal Model identified and defined organizational dimensions causally linked that could affect change on the OBU (Burke & Litwin, 1992). Strengths, weaknesses, opportunities, and threats were also analyzed to understand the context of the OBU (Fallon, 2017). Three key factors were identified. First, the OBU changed EHRs three weeks prior to the implementation of the practice change. Second, the indication for acetaminophen and ibuprofen were preprogrammed in the EHR and limited use of non-opioids to mild pain with a pain self-assessment score of 1 to 3 (on a scale of 0-10). Third, beliefs of staff and patients regarding opioids may have prevented acceptance of non-opioids and decreased patient satisfaction if used.

The Promoting Action on Research in Health Sciences (PARiHS) framework provided insight into overreliance on opioids. The PARiHS framework claims successful implementation of research into practice is a function of evidence, context, and facilitation (Kitson, Harvey, & McCormack, 1998). Often, context and/or facilitation are not addressed and the change fails. Despite significant evidence and support by professional organizations, context and facilitation have likely been ignored, resulting in slow or incomplete acceptance of multimodal analgesia use (White, 2017). Thus, to alter practice from opioid-centric to multimodal analgesia, the context and facilitation surrounding the practice change must be tailored to the setting in which the change needs to occur.

The assessment revealed heavy reliance on opioids for pain, with the majority (76%) of analgesics dispensed being opioids. Oxycodone was dispensed more than acetaminophen, ibuprofen, and ketorolac combined with 1 in 3 patients receiving only opioids. An electronic health record (EHR) review found non-opioid analgesics were prescribed for 76% (n = 47) of patients; and of those with a non-opioid prescribed, 40% (n = 19) of patients were not administered a non-opioid and received only opioid-containing analgesics. As a result of administration policy and prescribing practice, non-opioids were underutilized on the OBU.

Providing pain relief is an important consideration for healthcare providers, and current opioid-centric practices are ineffective. Alternatively, multimodal analgesia offers a balanced approach, which produces pain relief while having an opioid-sparing effect. Guided by the PARiHS framework, this project implemented multimodal analgesia practice as the standard of care on an OBU when opioids were administered. Results of this project answered the following clinical question: *Does multimodal analgesia, when practiced routinely, provide effective pain relief while simultaneously reducing unnecessary opioid use?*

## Methods

The design of the project was "pre-" "post-" implementation comparison, each containing a 60-day interval. To evaluate the impact of the practice change, pre-/post-implementation automated medication dispensing system (AMDS) data for commonly used analgesics were examined. Primary outcomes were pain relief and opioid use. To examine multimodal analgesia practices impact on primary outcomes, percentage of patients receiving different analgesic combinations (only opioids, multimodal analgesia, and only acetaminophen or NSAIDs) were examined. The aim of the practice change was to increase multimodal analgesia and decrease the percentage of patients receiving only opioids by 50%.

Data were collected from the AMDS on patients dispensed an analgesic; and examined to determine the combination of analgesics dispensed. Pain relief was measured using the numeric pain rating scale (NPRS) scores and patient satisfaction with pain control. The NPRS is an 11-point scale on which patients' self-rate pain sensation on a continuum with 0 being no pain and 10 being the worst pain imaginable. The first 10 NPRS scores following OBU admission were extracted during an EHR chart review on every 10th patient identified from the AMDS data. Patient satisfaction data were from monthly Press Ganey surveys provided 48 hours to 6 weeks post-discharge on the question *"how well your pain was controlled".* Opioid use was defined as both opioid reliance and opioid consumption. Opioid reliance was measured as the ratio of opioid to non-opioid analgesics dispensed in AMDS data. Opioid consumption was measured by morphine equivalent dose (MED) received from the AMDS data. MED is a common unit that represents the potency of various opioids. Data were recorded on an Excel spreadsheet for statistical analysis with the Statistical Analysis System (SAS 10.0). Data were analyzed using descriptive, chi-square, paired t-tests, and Mann Whitney U test statistics with a p-value of $\leq .05$

representing statistical significance. The project was approved through the university and site Institutional Review Boards and determined to be a quality improvement project.

Implementation was guided by Kotter's 8 Step Process for Leading Change (see Figure 1). Strategies to promote practice change included the following. A 15-minute educational session for RNs at a staff meeting and a handout supplied to each provider regarding multimodal analgesia evidence, recommendations from professional organizations, advice on addressing patient expectations and communicating the benefits of multimodal analgesia, and encouragement of collaboration among providers and RNs. A culture supportive of change, included identification of change agents (medical director, charge nurses), provision of weekly audit and feedback on clinical performance pertaining to pain management practices, and interviews of staff regarding behavior changes. Change agents promoted the practice change to staff daily during rounds. To facilitate increased non-opioid utilization, a change to the prescribed indication for acetaminophen and ibuprofen were sought. This included altering the acetaminophen and ibuprofen indications to "for all pain severities 1 to 10 on the scale; may co-administer with an opioid for score of 4 to 10". The lead author served as the facilitator of the practice change and possessed openness, flexibility, and consistency to modify the strategies during implementation as needed.

## Results

All practice change strategies, except modification to the acetaminophen and ibuprofen indications in the EHR OBU-specific order set were implemented, due the change in platform (see Table 1). Overall, 5,608 analgesics were dispensed to 1,240 patients during the pre/post-implementation 60-day intervals. Post-implementation patients received a lower rate of opioid-only treatment and a higher rate of multimodal analgesia (see Figure 2; $p < .0001$). Median

comparison of MED opioid consumption pre/post-implementation 60-day intervals were not different (see Table 2; $p = 0.6$). Approximately 80% of each group accounted for ≤ 50 MEDs (see Figure 3); thus, users were divided into two groups: the lowest 80% MED users and the highest 20% MED users. As shown in Table 3, fewer opioids were consumed among highest 20% MED users post-implementation ($p < 0.01$); and no differences were found among lowest 80% MED users ($p = 0.21$). Most importantly, opioid dispensing rates declined post-implementation ($p < .0001$; see Table 4). Press Ganey® patient satisfaction scores with pain control were lower ($p < 0.01$; see Figure 4).

EHR records randomly selected for review are shown in Table 5. The post-implementation patients were older ($p= 0.04$), yet no differences in MED rates were found among groups. Twice as many pre-implementation patients received opioid-only treatment but it did not reach significance ($p = 0.07$). NPRS scores were lower (see Figure 5; $p = 0.02$), indicating pain relief improved. This does not provide insight into why patient satisfaction scores were lower during this time period.

## Discussion

All practice change strategies attempted were considered successful. Alteration to electronic orders was delayed due to the EHR platform change. A modification request was submitted to OBU leadership, and is under consideration.

Notably, a 52.4% decrease in opioid-only pain management occurred after project implemented. Remarkably, a decrease in opioid MED was found among the highest opioid utilizers. This suggests that multimodal analgesia has the greatest effect on usage when greater amounts of opioids are required for pain relief. However, it remains unclear if greater MED usage was due to the length of stay and/or clinical condition of the high utilizer patients. The

median length of patient stay on the OBU is 18 hours, limiting the evaluation period for the impact of multimodal analgesia on the opioid consumption. Furthermore, intense acute nociceptive pain may require the opioid relieving effect on emotional distress, as in a study by Warren et al. (2017). On the first post-operative day after hernia repair when acute nociceptive pain was at its greatest, the multimodal analgesia group required significantly less MED than the group treated with only opioids (Warren et al., 2017). One important strength of this project, compared to Warren et al. (2017), was our large MED sample size (N = 1240).

Pain relief is not compromised by the increased multimodal practices, (Baily et al., 2013; Derry, et al., 2013; Derry et al., 2013a; Derry et al., 2015; Moore et al., 2015; Toms et al., 2009). Opioid dispensing rates decreased and corresponded to the increase in non-opioid dispensing in this project. As shown, there were a greater proportion of patients receiving multimodal and half as many receiving only opioids, resulting in lower NPRS scores. This suggests multimodal analgesia produces better pain relief. Patient satisfaction with pain treatment, alternatively, was lower. This is not be surprising, as research has shown more opioid prescribing leads to greater satisfaction (Sites et al., 2018). Patient satisfaction with pain control did appear to fluctuate throughout the previous 12-months so it is unknown if decreased pain control satisfaction was incidental or related to the practice change. The low return rate of the satisfaction surveys, as only 55 of the eligible 597 patients responded to the pain control question during the post-implementation period. Furthermore, decreased staffing during December and January due to peak flu season is common, and may contribute to satisfaction rates (CDC, 2018). The ongoing challenge is to provide both effective and satisfactory pain relief, while simultaneously limiting unnecessary opioid use.

Future confirmed and pending policy changes may impact this project. As a result of this project, the organization is reviewing a policy that inadvertently promoted opioid-centric practices. The organization is also considering altering the generic indication currently used, for both acetaminophen and ibuprofen system-wide to “for all pain severities (score 1-10/10); may co-administer with an opioid for moderate to severe pain (score 4-10/10)”. Within a month of project completion, The Joint Commission visited the organization and project results and recommendations were acknowledged in a favorable manner to address policy and practice regarding use of opioids. Furthermore, policy change in June 2018 in this state will require the organization to access the state automated prescription system prior to provider prescribing opioids in order to assess patient opioid use history, strengthening the results of this project.

## Limitations

Limitations included the following. The design and scope of the project did not capture additional meaningful data to explain potential differences in pain control satisfaction, length of stay, diagnosis, and current opioid use. Different patients were compared pre-/post-implementation; thus, there was no way to determine baseline pain control satisfaction level. The patients may have also been experiencing chronic pain, which may have impacted the patient satisfaction scores. Furthermore, a greater proportion of patients in the pre-implementation interval received >200 MED. Because length of stay was not determined, it is difficult to ascertain whether the decrease in high MED utilizers in the post-implementation group was due to multimodal practices or length of stay. Diagnosis also contributed; as providers stated they prescribe based on clinical condition, thus diagnosis was likely influencing prescribing patterns. Without precise awareness of diagnosis pre/post-implementation, it was difficult to determine whether clinical conditions influenced outcome. Finally, knowing whether patients are current

opioid users could alter how results were interpreted. Opioid-naïve patients require a smaller opioid MED compared to opioid-tolerant patients (Adesoye & Duncan, 2017). Whether a patient is naïve or tolerant is not assessed on the OBU; thus, could not be extracted from the EHR. To address these limitations, 60-day intervals to obtain a larger sample size were used, minimizing impact on the findings.

Although the external environment created an opportunity for the project to succeed, it may also have served as a limitation through bias. The opioid crisis frequented the news during the project timeline. In October 2017, the opioid crisis was deemed a public health emergency by the President of the US (Allen & Kelly, 2017). Because the opioid crisis was poignant, it is possible providers, RNs, and/or patients had a bias against using opioids which contributed to the decrease in MED. To adjust for this, education and the feedback reports repeatedly emphasized the purpose of this practice change was not to withhold opioids when deemed necessary, but instead to use a variety of analgesics.

## Conclusion

Pain is the most prevalent patient complaint in the US (National Institutes of Health, 2013). Dependence on opioids for pain has led to devastating consequences. Researchers found opioids are more effective and efficient when given in combination with non-opioid analgesics (Baily et al., 2013; Derry, et al., 2013; Derry et al., 2013a; Derry et al., 2015; Moore et al., 2015; Toms et al., 2009). A practice change tailored for an OBU established multimodal analgesia as the standard of care, leading to a significant MED decrease in high opioid utilizers without sacrificing pain relief. Patient satisfaction, however, decreased. These results were unique to this setting and are not generalizable. Nevertheless, these results suggest that multimodal analgesia

could potentially provide effective pain relief in similar settings, while also potentially reducing the perpetuation of the opioid crisis.

## Implications for Practice and Further Study in the Field

Reliance on opioids as the only treatment for pain should be limited. Evidence demonstrates using a variety of analgesics can decrease dependence on any one medication. This project revealed that in an OBU, multimodal practices may have reduced the perpetuation of the opioid crisis by limiting unnecessary opioid use. Further study in multiple settings with acute nociceptive pain are needed. Future projects should include practice change strategies aimed at increasing patient satisfaction while implementing multimodal practices and emphasis on including patients as key stakeholders. Additional pharmacological and non-pharmacological pain management options should also be considered. The addition of a pharmacist to the team would be beneficial. Efforts to enable multimodal analgesia as the standard of care in settings treating patients similar to those of the OBU unit could produce similar results.

## Figures

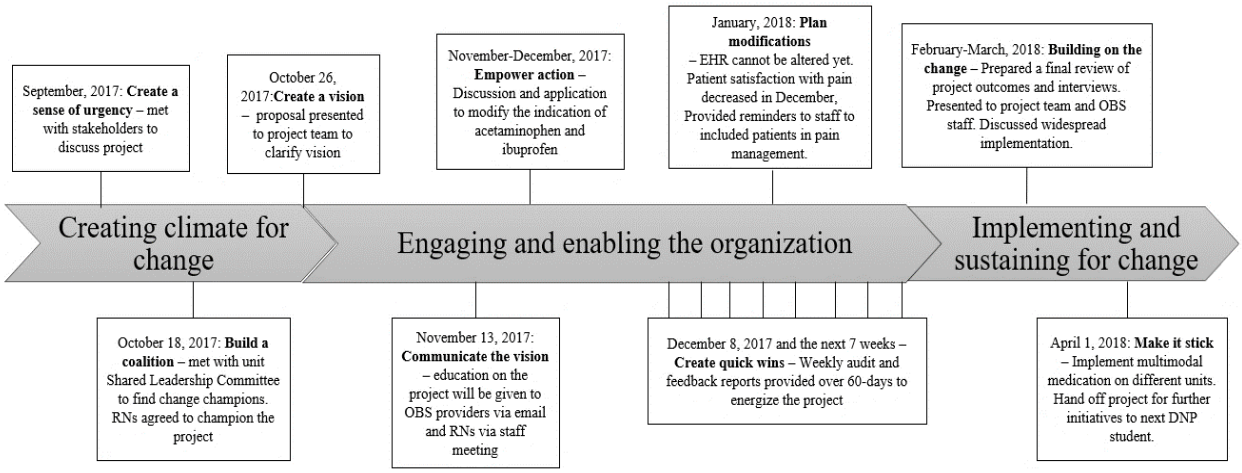



*Figure 1***.** Timeline as guided by Kotter's 8 Step Process for Leading Change

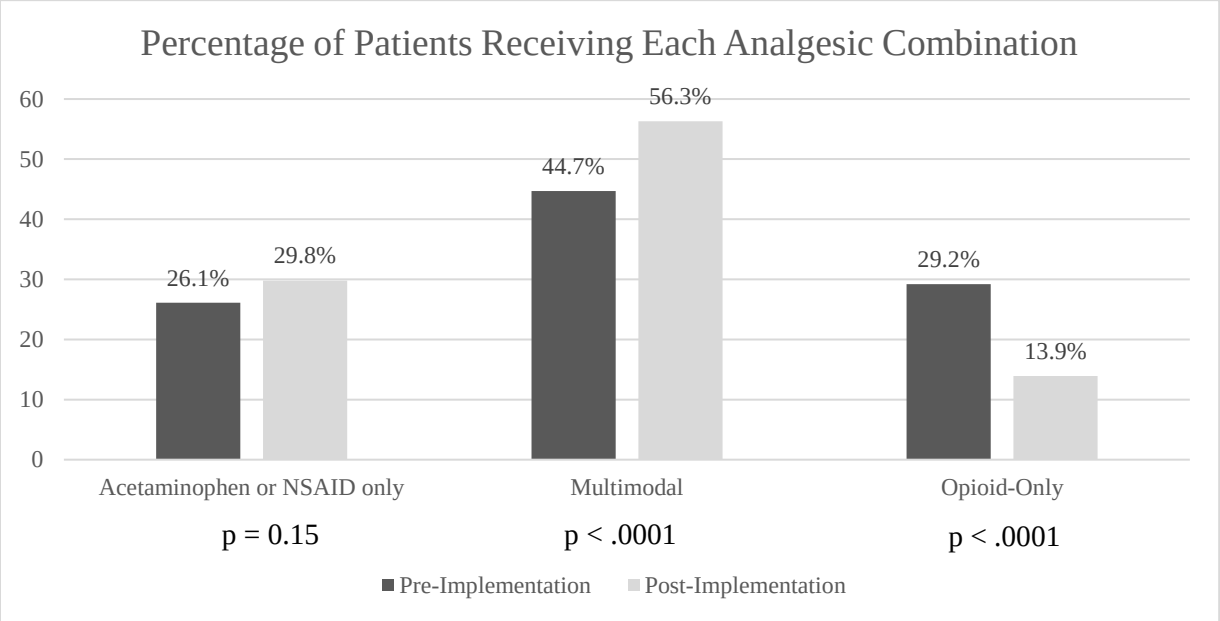



*Figure 2.* Percentage of patients pre-/post-implementation receiving opioids-only, multimodal treatment, or Acetaminophen or NSAID only

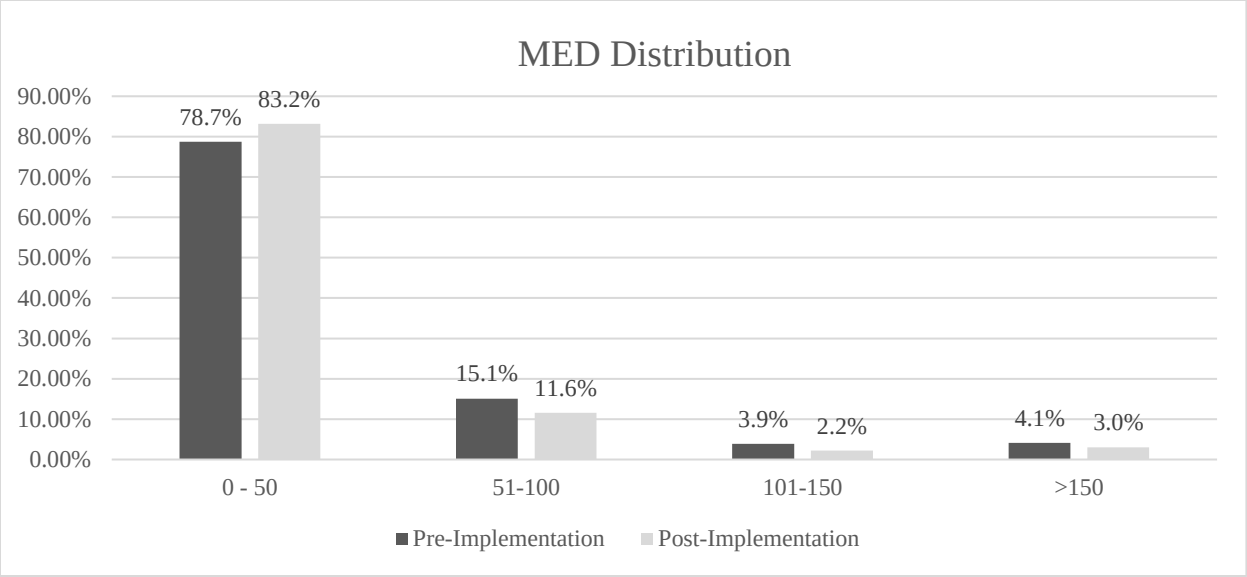



*Figure 3.* Distribution (0-50; 51-100; 101-150; and >150) of MED pre-/post-implementation

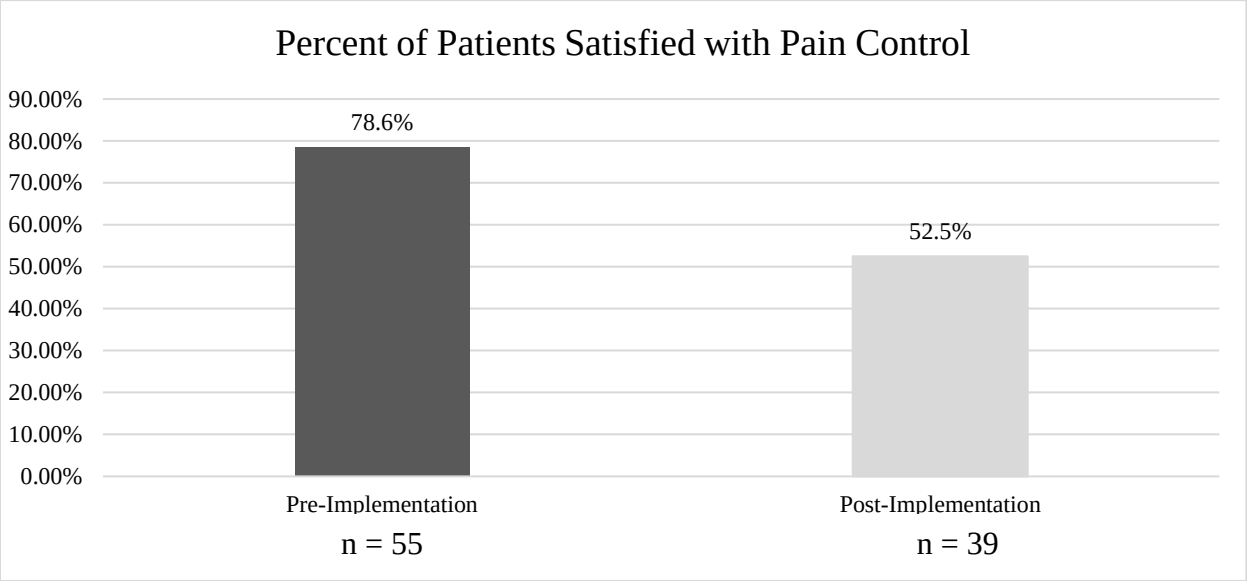



*Figure 4*. Percent of patients satisfied with pain control on patient experience satisfaction report on OBU

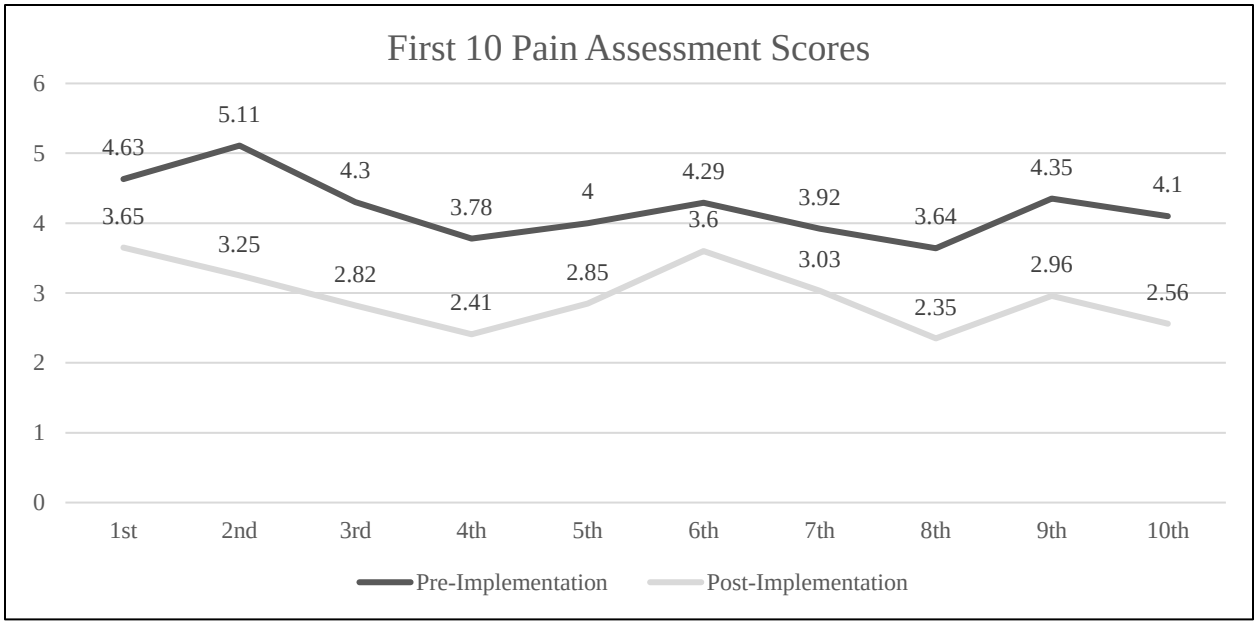



*Figure 5*. NPRS pain scores for first 10 assessments

## Tables

*Table 1*. Practice change strategy outcomes measured, when measured, and result

| **Strategy** | **How measured** | **When measured** | **Result** |
|---|---|---|---|
| Build a Coalition | Checklist tool (Charge nurses) | Every 12hr shift | Multimodal analgesia was discussed at 57.4% of shifts (n = 58 of 101) |
| | Interview (Medical director) | November 2017 – January 2018 | 3 provider emails<br>1 meeting (December) |
| Education<br>• RN staff meeting<br>• Educational handout for providers<br>• Educational flyer for resource | Pre/Post-test (RNs) | Pre/post education | 57% (n = 19 of 33) RNs attended<br>Pre-test: 67% mean score (SD 20)<br>Post-test: 100% mean score (SD 0) |
| | Survey (Providers) | November 15 – December 1 | 83.3% (n = 10 of 12) PAs/NPs received handout<br>46.6% (n = 7 of 15) physicians received handout<br>100% (n = 9) surveyed agreed with project |
| Modification of acetaminophen and ibuprofen order indication | Not completed | | |
| Audit and feedback | Automated medication dispensing system report | Weekly from December 1, 2017 – January 29, 2018 | Weekly opioid-only therapy was consistently 50% lower than pre-implementation data |
| Behavior Change Review | Interview | February 2018 | RNs themes:<br>• "Once I explained multimodal to patients, most of them agreed"<br>• "I changed my practices after learning about multimodal analgesia"<br>• "Multimodal seemed to help some patients more than others"<br>Provider themes:<br>• "I always prescribe a variety of pain medications"<br>• "I treat patients based on their clinical presentation" |

*Table 2.* Opioid consumption outcome with all patients pre/post-implementation

| | **Pre-implementation patients receiving an opioid: N = 464** | **Post-implementation patients receiving an opioid: N = 404** | |
|---|---|---|---|
| | **Median (IQR) [Range]** | **Median (IQR) [Range]** | **p-value** |
| Median MED | 20 (35) [2 – 527.5] | 20 (30) [1 – 392] | 0.6 |

*Table 3.* Pre-/post-implementation high utilizers (top 20%) and low utilizers (bottom 80%) and p-values

| | **20% high utilizers** | | | **80% low utilizers** | | |
|---|---|---|---|---|---|---|
| | Pre-implementation **N = 93** | Post-implementation **N = 81** | | Pre-implementation **N = 372** | Post-implementation **N = 323** | |
| | **N (%)** | **N (%)** | p-value | **N (%)** | **N (%)** | p-value |
| Multimodal Analgesia | 46 (48.4%) | 72 (88.9%) | <.0001 | 232 (62.4%) | 249 (77.1%) | <.0001 |
| Opioid-only Analgesia | 49 (51.6%) | 9 (11.1%) | <.0001 | 139 (37.3%) | 74 (22.9%) | <.0001 |
| | **Mean ± SD [Range]** | **Mean ± SD [Range]** | | **Mean ± SD [Range]** | **Mean ± SD [Range]** | |
| Average MED | 118.71 ± 85.34 [53 – 527.5] | 91.54 ± 60.35 [45 – 392] | 0.01 | 19.15 ± 13.25 [2 – 53.5] | 18.37 ± 11.62 [1 – 46] | 0.21 |

*Table 4.* Ratio of opioids to non-opioids dispensed

| **Dispenses** | **Pre-implementation: N = 2877** | **Post-implementation: N = 2731** | |
|---|---|---|---|
| | **N (%)** | **N (%)** | **p-value** |
| Opioid | 2184 (75.9%) | 1745 (63.9%) | < .0001 |
| Non-Opioid | 693 (24.1%) | 986 (36.1%) | < .0001 |

*Table 5.* Pain self-assessment NPRS scores from EHR review

| | **Pre-implementation N = 62** | **Post-implementation N = 58** | |
|---|---|---|---|
| | **n (%)** | **n (%)** | **p-value** |
| Multimodal Analgesia used | 28 (45.2%) | 31 (53.5%) | 0.36 |
| Opioid-only Analgesia used | 17 (27.4%) | 8 (13.8%) | 0.07 |
| Acetaminophen or NSAID only | 17 (27.4%) | 19 (32.8%) | 0.52 |
| Non-Opioid was Ordered (Yes) | 47 (75.8%) | 51 (87.9%) | 0.10 |
| If Ordered, Non-Opioid was Used (Yes) | 28 (60.9%) | 39 (76.5%) | 0.08 |
| | **Median [IQR] [Range]** | **Median [IQR] [Range]** | |
| MED | 15 [30] [0 – 135] | 10 [26] [0 – 168.5] | 0.5 |
| | **Mean ± SD [Range]** | **Mean ± SD [Range]** | |
| Age (years) | 51.27 ± 19.76 [18 – 99] | 58.81 ± 19.13 [18 – 93] | 0.04 |
| Average NPRS Score | 3.00 ± 1.91 [0 – 10] | 4.21 ± 2.27 [0 – 10] | .002 |

References

Adesoye, A., & Duncan, N. (2017). Acute pain management in patients with opioid tolerance. *U. S. Pharmacist, 42,* 28-32.

Allen, G., & Kelly, A. (2017). Trump administration declares crisis a public health emergency. In *NPR*. Retrieved from https://www.npr.org/2017/10/26/560083795/president-trump-may-declare-opioid-epidemic-national-emergency

American Society of Anesthesiologists Task Force on Acute Pain Management. (2012). Practice guidelines for acute pain management in the perioperative setting: An updated report by the American Society of Anesthesiologists Task Force on Acute Pain Management. *Anesthesiology, 116,* 248-273.

Bailey, E., Worthington, H. V., van Wijk, A., Yates, J. M., Coulthard, P., & Afzal, Z. (2013). Ibuprofen and/or paracetamol (acetaminophen) for pain relief after surgical removal of lower wisdom teeth. *The Cochrane Library*. doi: 10.1002/14651858.CD004624.pub2

Boscarino, J. A., Rukstalis, M., Hoffman, S. N., Han, J. J., Erlich, P. M., Gerhard, G. S., & Stewart, W. F. (2010). Risk factors for drug dependence among out-patients on opioid therapy in a large US health-care system. *Addiction, 105,* 1776-1782. doi: 10.1111/j.1360-0443.2010.03052.x

Burke, W. W., & Litwin, G. H. (1992). A causal model of organizational performance and change. *Journal of Management, 18,* 523-545. doi: 10.1177/014920639201800306

Cantrill, S. V., Brown, M. D., Carlisle, R. J., Delaney, K. A., Hays, D. P., Nelson, L. S., ... & Whitson, R. R. (2012). Clinical policy: Critical issues in the prescribing of opioids for adult patients in the emergency department. *Annals of Emergency Medicine, 60*. doi: 10.1016/j.annemergmed.2012.06.013

Centers for Disease Control and Prevention. (2018). Weekly U.S. influenza surveillance report. Retrieved from https://www.cdc.gov/flu/weekly/index.htm

Centers for Disease Control and Prevention (2016). *Wide-ranging online data for epidemiologic research (WONDER).* Retrieved from http://wonder.cdc.gov.

Chang, H. Y., Daubresse, M., Kruszewski, S. P., & Alexander, C. G. (2014). Prevalence and treatment of pain in emergency departments in the United States, 2000-2010. *Pharmacoepidemiology and Drug Safety*, *23*, 421-431. doi: 10.1016/j.ajem.2014.01.015.

Daubresse, M., Chang, H. Y., Yu, Y., Viswanathan, S., Shah, N. D., Stafford, R. S., ... & Alexander, G. C. (2013). Ambulatory diagnosis and treatment of non-malignant pain in the United States, 2000–2010. *Medical Care*, *51*. doi: 10.1097/MLR.0b013e3182a95d86

Derry, S., Derry, C. J., & Moore, R. A. (2013). Single dose oral ibuprofen plus oxycodone for acute postoperative pain in adults. *Cochrane Database Syst. Rev*. doi: 10.1002/14651858.CD010289.pub2

Derry, C. J., Derry, S., & Moore, R. A. (2013a). Single dose oral ibuprofen plus paracetamol (acetaminophen) for acute postoperative pain. *The Cochrane Database of Systematic Reviews*, *6*. doi: 10.1002/14651858.CD010210.pub2

Derry, S., Karlin, S. M., & Moore, R. A. (2015). Single dose oral ibuprofen plus codeine for acute postoperative pain in adults. *The Cochrane Library*. doi: 10.1002/14651858.CD010107.pub3

Fallon, N. (2017). SWOT analysis: What is it and when to use it. In *Business News Daily*. Retrieved from http://www.businessnewsdaily.com/4245-swot-analysis.html

Kalso, E., Edwards, J. E., Moore, R. A., & McQuay, H. J. (2004). Opioids in chronic non-cancer pain: systematic review of efficacy and safety. *Pain, 112*, 372-380. doi: 10.1016/j.pain.2004.09.01

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence-based practice: a conceptual framework. *Quality and Safety in Health Care, 7*, 149-158. doi: 10.1136/qshc.7.3.149

Kotter, J. P. (1996). Why transformation efforts fail. *The Journal of Product Innovation Management, 2*, 170.

Paulozzi, L. J., Jones, C. M., Mack, K. A., & Rudd, R. A. (2011). Vital signs: Overdose of prescription pain relievers - United States 1999-2008. In *Morbidity and Mortality Weekly Report*. Retrieved from https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6043a4.htm?s_cid=mm6043a4_w

Pezalla, E. J., Rosen, D., Erensen, J. G., Haddox, J. D., & Mayne, T. J. (2017). Secular trends in opioid prescribing in the USA. *Journal of Pain Research, 10*, 383.

Moore, R. A., Derry, S., McQuay, H. J., & Wiffen, P. J. (2015). Single dose oral analgesics for acute postoperative pain in adults. *Cochrane Database Syst Rev*, *9*. doi: 10.1002/14651858.CD008659.pub3

National Institutes of Health. (2013). Pain management. In *Research Portfolio Online Reporting Tools*. Retrieved from https://report.nih.gov/nihfactsheets/ViewFactSheet.aspx?csid=57

Onishi, E., Kobayashi, T., Dexter, E., Marino, M., Maeno, T., & Deyo, R. A. (2017). Comparison of opioid prescribing patterns in the United States and Japan: Primary care physicians' attitudes and perceptions. *The Journal of the American Board of Family Medicine, 30*, 248-254. doi: 10.3122/jabfm.2017.02.160299

Shah, A., Hayes, C. J., & Martin, B. C. (2017). Characteristics of initial prescription episodes and likelihood of long-term opioid use-United States, 2006-2015. *MMWR. Morbidity and Mortality Weekly Report, 66*, 265-269.

Sites, B. D., Harrison, J., Herrick, M. D., Masaracchia, M. M., Beach, M. L., & Davis, M. (2018). Prescription opioid use and satisfaction with care among adults with musculoskeletal conditions. *The Annals of Family Medicine, 16*, 6-13. doi: 10.1370/afm.2148

Substance Abuse and Mental Health Services Administration. (2013). Highlights of the 2011 drug abuse warning network (DAWN) findings on drug-related emergency department visits. In *The DAWN Report*. Retrieved from https://www.samhsa.gov/data/sites/default/files/DAWN127/DAWN127/sr127-DAWN-highlights.htm

Substance Abuse and Mental Health Services Administration. (2010). Substance abuse treatment admissions involving use of pain relievers: 1998 and 2008. In *The TED Report*. Retrieved from https://www.dea.gov/divisions/dal/2010/dallas071610.pdf

Teater, D. (2014). Evidence for the efficacy of pain medications. In *National Safety Council*. Retrieved from http://www.nsc.org/RxDrugOverdoseDocuments/Evidence-Efficacy-Pain-Medications.pdf

The Joint Commission. (2012). Safe use of opioids in the hospital. In *Sentinel event alert: Issue 49*. Retrieved from https://www.jointcommission.org/assets/1/18/SEA_49_opioids_8_2_12_final.pdf

Thorson, D., Biewen, P., Bonte, B., Epstein, H., Haake, B., Hansen, C., & Hooten, M. (2014). Acute pain assessment and opioid prescribing protocol. In *Institute for Clinical Systems*

*Improvement*. Retrieved from https://www.icsi.org/guidelines__more/catalog_ guidelines_and_more/catalog_guidelines/catalog_neurological_guidelines/pain/

Toms, L., Derry, S., Moore, R. A., & McQuay, H. J. (2009). Single dose oral paracetamol (acetaminophen) with codeine for postoperative pain in adults. *The Cochrane Library*. doi: 10.1002/14651858.CD001547.pub2

Warren, J. A., Stoddard, C., Hunter, A. L., Horton, A. J., Atwood, C., Ewing, J. A., ... & Carbonell, A. M. (2017). Effect of multimodal analgesia on opioid use after open ventral hernia repair. *Journal of Gastrointestinal Surgery*, *21*, 1692-1699. doi: 10.1007/s11605-017-3529-4

White, P. F. (2017). Expert Opinion of Pharmacotherapy. *What are the advantages of non-opioid analgesic techniques in the management of acute and chronic pain?*, *18,* 329-333. doi:10.1080/14656566.2017.1289176

Young, A., & Buvanendran, A. (2012). Recent advances in multimodal analgesia. *Anesthesiology Clinics*, *30*, 91-100. doi:10.1016/j.anclin.2011.12.002

DNP Project Oral Defense Presentation

Slide 1

Effect on Opioid Use following the Implementation of Evidence-Based Pain Management Practices for an Observation Unit

Kathryn Ellens

DNP Project Final Defense

April 3, 2018

Grand Valley State University Kirkhof College of Nursing

Slide 2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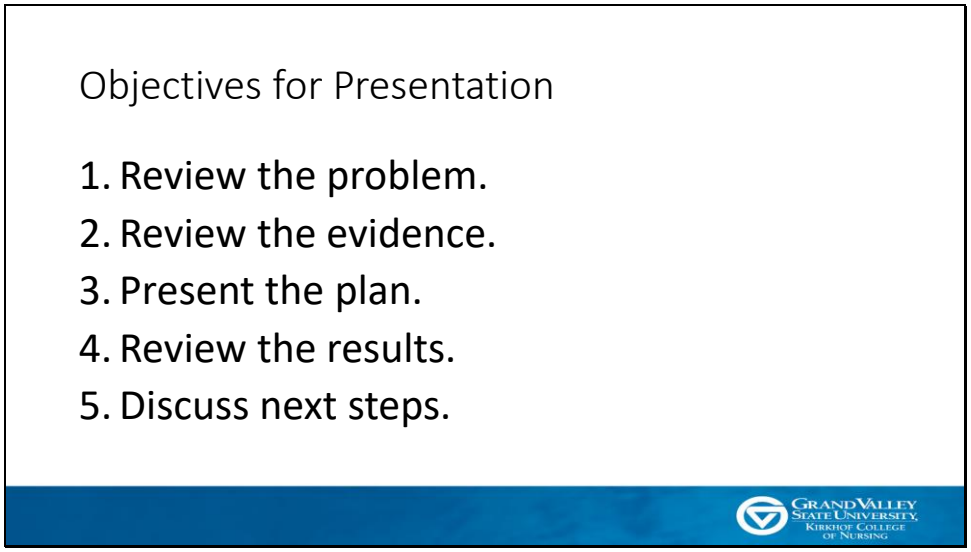
Grand Valley State University
Kirkhof College of Nursing

Slide 3


Objectives for Presentation
1. Review the problem.
2. Review the evidence.
3. Present the plan.
4. Review the results.
5. Discuss next steps.
Grand Valley State University
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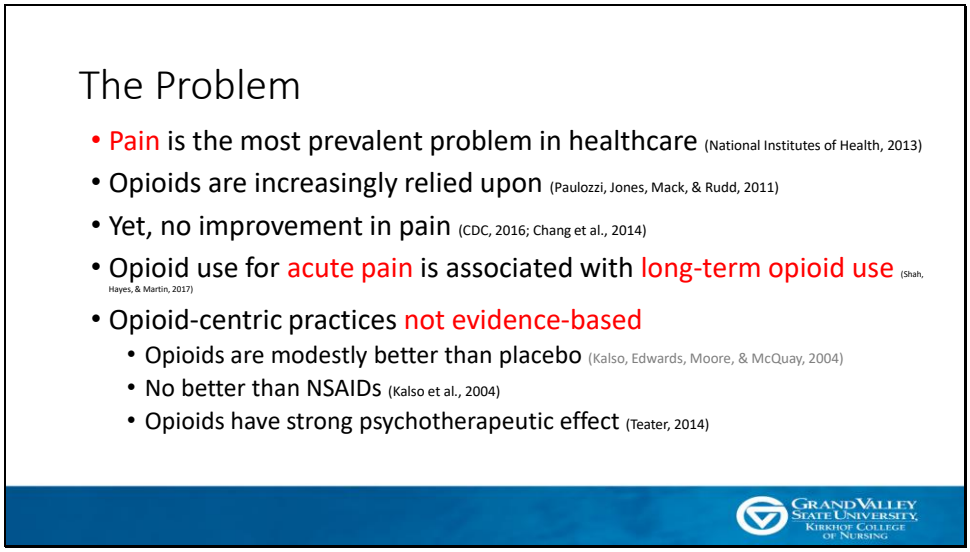
Slide 4


The Problem
• Pain is the most prevalent problem in healthcare (National Institutes of Health, 2013)
• Opioids are increasingly relied upon (Paulozzi, Jones, Mack, & Rudd, 2011)
• Yet, no improvement in pain (CDC, 2016; Chang et al., 2014)
• Opioid use for acute pain is associated with long-term opioid use (Shah, Hayes, & Martin, 2017)
• Opioid-centric practices not evidence-based
• Opioids are modestly better than placebo (Kalso, Edwards, Moore, & McQuay, 2004)
• No better than NSAIDs (Kalso et al., 2004)
• Opioids have strong psychotherapeutic effect (Teater, 2014)
Grand Valley State University
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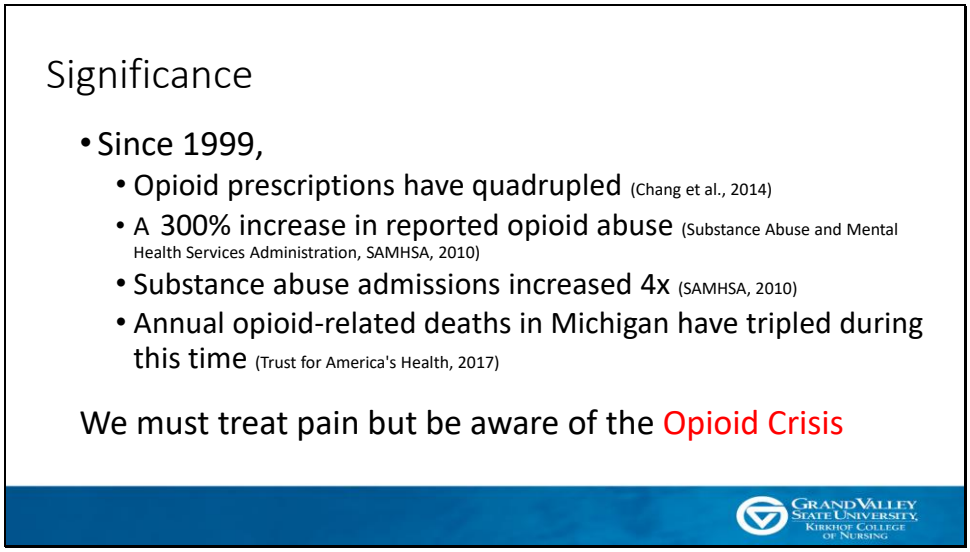
Slide 5


Significance
• Since 1999,
• Opioid prescriptions have quadrupled (Chang et al., 2014)
• A 300% increase in reported opioid abuse (Substance Abuse and Mental Health Services Administration, SAMHSA, 2010)
• Substance abuse admissions increased 4x (SAMHSA, 2010)
• Annual opioid-related deaths in Michigan have tripled during this time (Trust for America's Health, 2017)
We must treat pain but be aware of the Opioid Crisis
Grand Valley State University
Kirkhof College of Nursing

Slide 6

## Clinical Question

For people experiencing pain, would using evidence-based pain management provide effective pain relief and reduce opioid use compared to opioid-centric pain management?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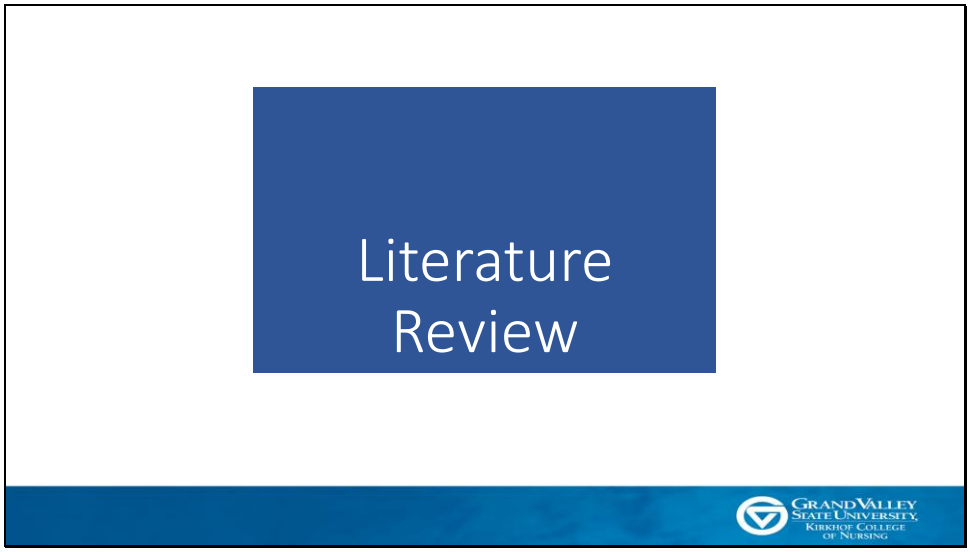
Slide 7


Literature Review
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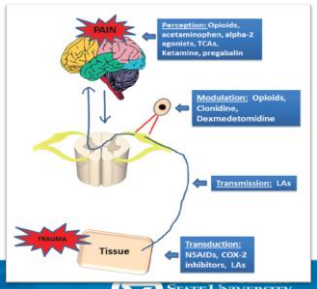
Slide 8

## Efforts to Decrease Reliance on Opioids – Current Recommendations

- American College of Emergency Physicians (Cantril et al., 2012)
- American Society Anesthesiologists Task Force on Acute Pain Management (American Society of Anesthesiologists Task Force, 2012)
- The Joint Commission (The Joint Commission, 2012)
- Institute for Clinical Systems Improvement (Thorson et al., 2014)

**Multimodal Analgesia**

Combining ≥2 analgesics with different mechanisms of action to produce synergistic pain relief

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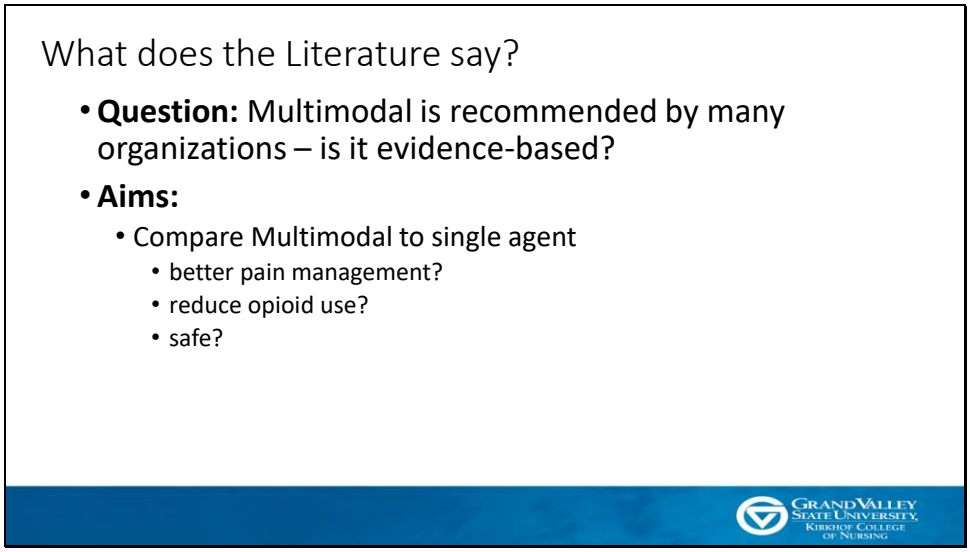
Slide 9


What does the Literature say?
• Question: Multimodal is recommended by many organizations – is it evidence-based?
• Aims:
• Compare Multimodal to single agent
• better pain management?
• reduce opioid use?
• safe?
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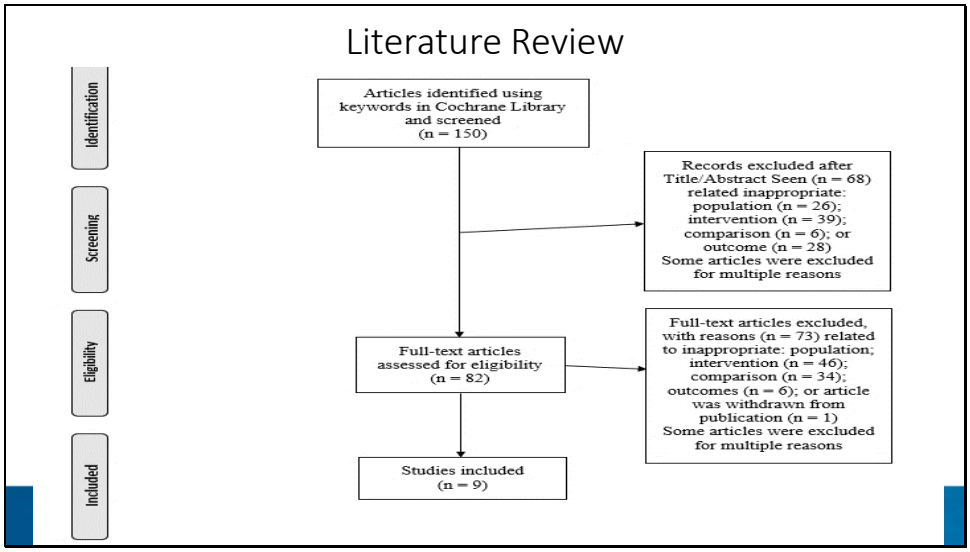
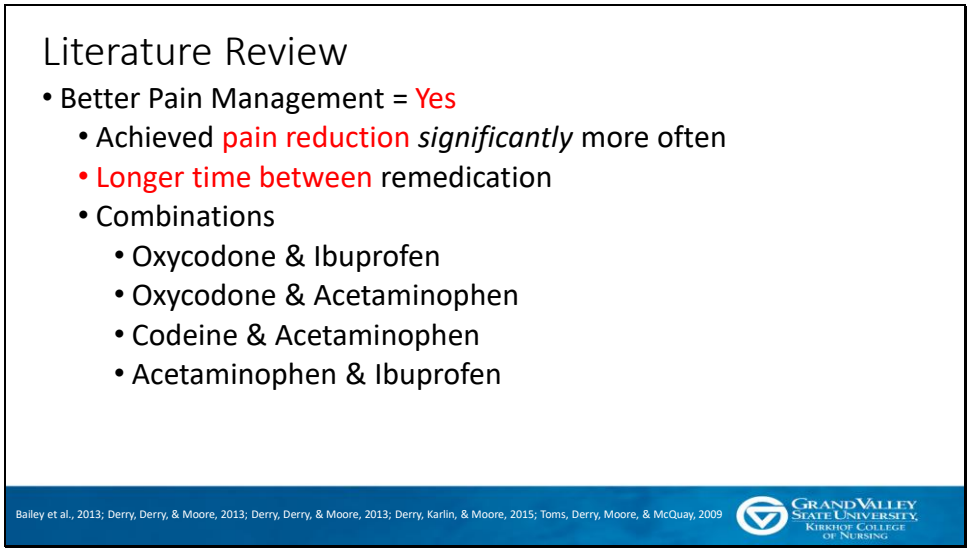
Slide 10


Literature Review
Identification
Screening
Eligibility
Included
Articles identified using keywords in Cochrane Library and screened (n = 150)
Records excluded after Title/Abstract Seen (n = 68) related inappropriate: population (n = 26); intervention (n = 39); comparison (n = 6); or outcome (n = 28) Some articles were excluded for multiple reasons
Full-text articles assessed for eligibility (n = 82)
Full-text articles excluded, with reasons (n = 73) related to inappropriate: population; intervention (n = 46); comparison (n = 34); outcomes (n = 6); or article was withdrawn from publication (n = 1) Some articles were excluded for multiple reasons
Studies included (n = 9)

Slide 11


Literature Review
• Better Pain Management = Yes
• Achieved pain reduction *significantly* more often
• Longer time between remedication
• Combinations
• Oxycodone & Ibuprofen
• Oxycodone & Acetaminophen
• Codeine & Acetaminophen
• Acetaminophen & Ibuprofen
Bailey et al., 2013; Derry, Derry, & Moore, 2013; Derry, Derry, & Moore, 2013; Derry, Karlin, & Moore, 2015; Toms, Derry, Moore, & McQuay, 2009
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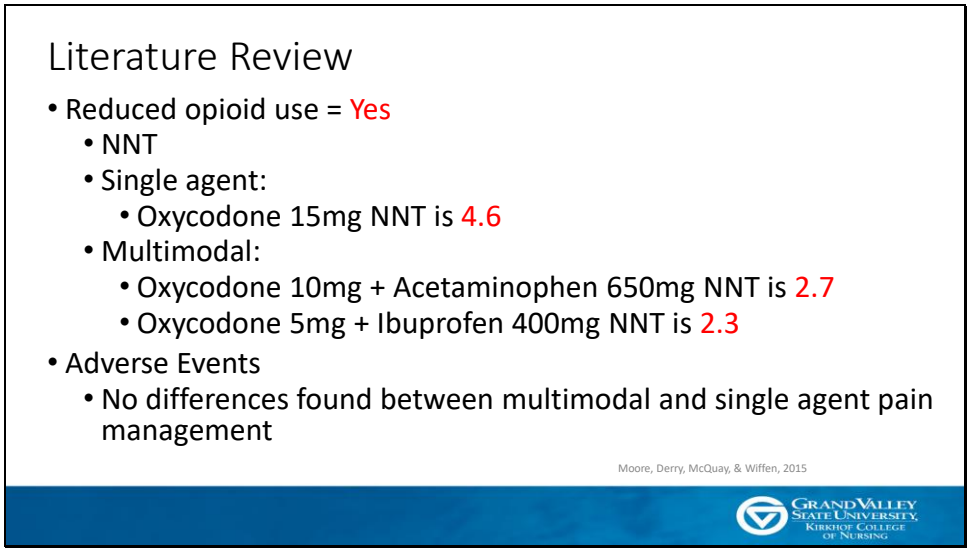
Kirkhof College of Nursing

Slide 12


Literature Review
• Reduced opioid use = Yes
• NNT
• Single agent:
• Oxycodone 15mg NNT is 4.6
• Multimodal:
• Oxycodone 10mg + Acetaminophen 650mg NNT is 2.7
• Oxycodone 5mg + Ibuprofen 400mg NNT is 2.3
• Adverse Events
• No differences found between multimodal and single agent pain management
Moore, Derry, McQuay, & Wiffen, 2015
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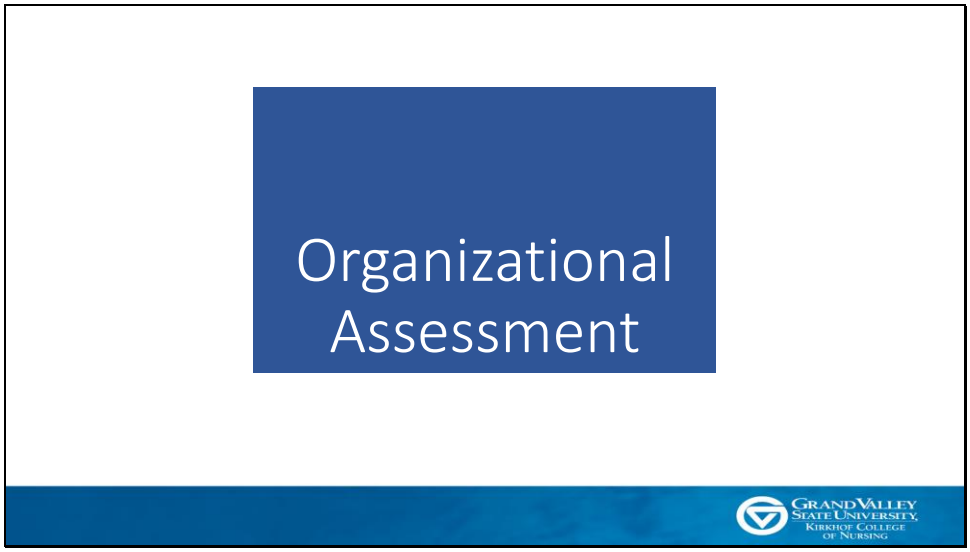
Slide 13


Organizational Assessment
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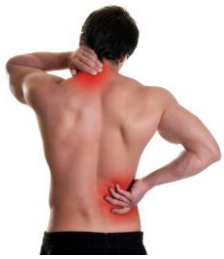
Slide 14

## Setting: Midwest hospital ED Observation unit

Most common diagnoses

1. Chest Pain (29%)
2. Kidney Stones (8.4%)
3. ESRD (4.4%)
4. Heart Failure (4.1%)
5. Back Pain (4%)



Others include cellulitis, dental abscess, psychiatric placement, falls/fractures/weakness (need rehab)

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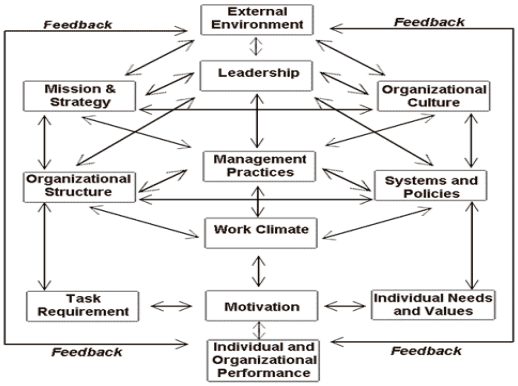
Slide 15

## Assessing the Organization

### Burke-Litwin Model

- Two distinct dynamics
  - Climate
  - Culture
- Transformational and Transactional variables
- External environment is the main driver of change

Burke & Litwin, 1992

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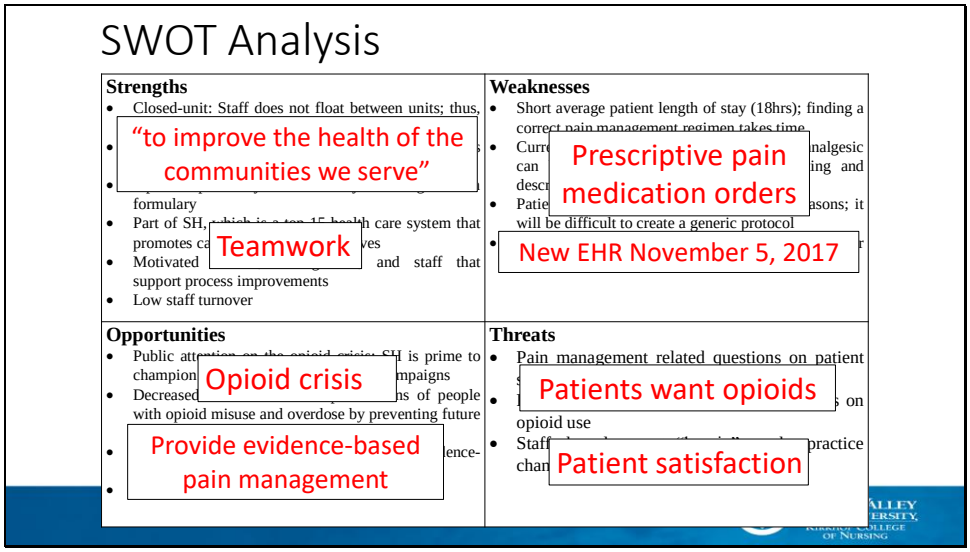
Slide 16


SWOT Analysis
Strengths
Closed-unit: Staff does not float between units; thus,
formulary
Part of SH,
promotes ca
ves
Motivated
and staff that
support process improvements
Low staff turnover
"to improve the health of the communities we serve"
Teamwork
Weaknesses
Short average patient length of stay (18hrs); finding a
correct pain management regimen takes time
Curre
nalgesic
can
ing and
descr
Patie
asons; it
will be difficult to create a generic protocol
r
Prescriptive pain medication orders
New EHR November 5, 2017
Opportunities
Public att
is prime to
champion
mpaigns
Decreased
ns of people
with opioid misuse and overdose by preventing future
ence-
Opioid crisis
Provide evidence-based pain management
Threats
Pain management related questions on patient
s on
opioid use
Staff
practice
chan
Patients want opioids
Patient satisfaction

Slide 17

## Needs Assessment

- **75%** of analgesics used are opioids
- Nearly 1 in 3 (29%) patients received *only opioids*
- Oxycodone used more than acetaminophen, ibuprofen, and ketorolac **combined**
- Non-opioids not ordered for **25%** of patients
- When ordered, non-opioids *still not given* for **40%** of patients

Slide 18


DNP Project Plan
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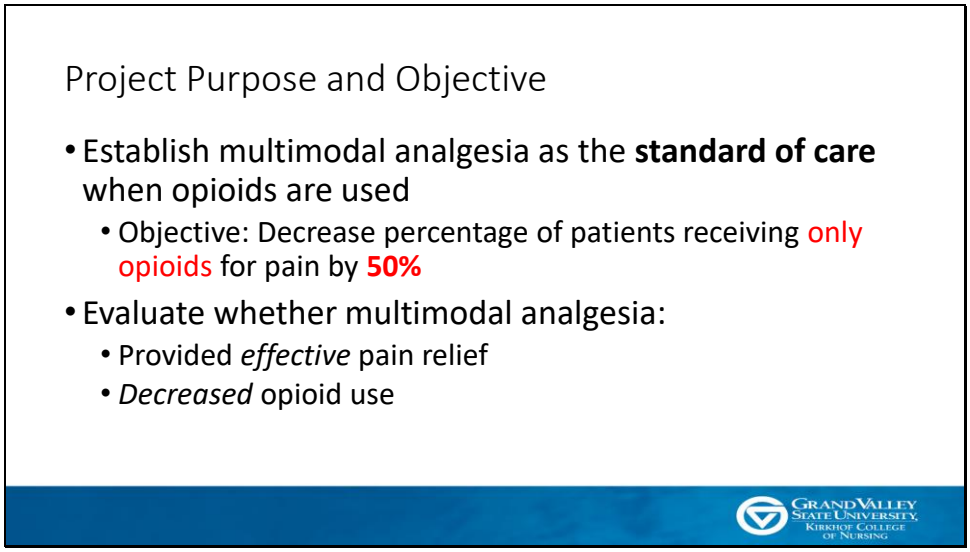
Slide 19


Project Purpose and Objective
• Establish multimodal analgesia as the **standard of care** when opioids are used
• Objective: Decrease percentage of patients receiving only opioids for pain by **50%**
• Evaluate whether multimodal analgesia:
• Provided *effective* pain relief
• *Decreased* opioid use
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Slide 20

## Type of Project

- Quality Improvement Project
  - Seeking to improve the delivery of care in order to:
    - Improve patient experience
      - pain relief
    - Improve outcomes
      - decrease chance of perpetuating opioid crisis


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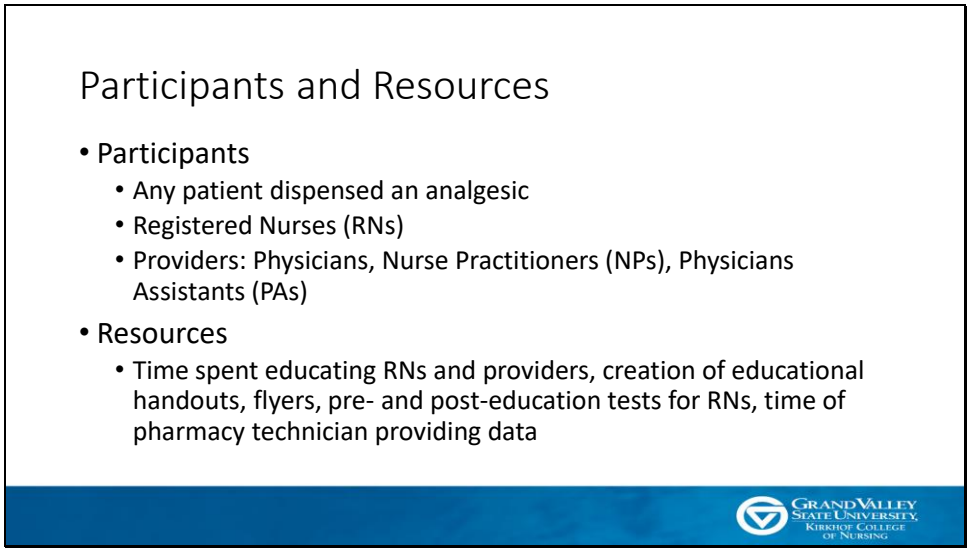
Slide 21


Participants and Resources
• Participants
• Any patient dispensed an analgesic
• Registered Nurses (RNs)
• Providers: Physicians, Nurse Practitioners (NPs), Physicians Assistants (PAs)
• Resources
• Time spent educating RNs and providers, creation of educational handouts, flyers, pre- and post-education tests for RNs, time of pharmacy technician providing data
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Slide 22

## Ethics and Human Subjects Protection

- Deemed Quality Improvement Project

GRAND VALLEY STATE UNIVERSITY

DATE: June 5, 2017

TO: Sandra Spoelstra, PhD, RN
FROM: Grand Valley State University Human Research Review Committee
STUDY TITLE: [1081127-1] Implementation of an Evidence-Based Opioid Reduction Pain Management Protocol for an Observation Unit
REFERENCE #: 17-241-H
SUBMISSION TYPE: New Project

ACTION: RESEARCH - NOT HSR
EFFECTIVE DATE: June 5, 2017
REVIEW TYPE: Administrative Review

Thank you for your submission of materials for your planned research study. Upon review of the aims and description of your study, it has been determined that this project *DOES NOT* meet the definition of covered human subjects research* according to current federal regulations. The project, therefore, *DOES NOT* require further review and approval by the HRRC.

According to your study description, you are conducting a study to decerase unnecessary use of opiates. While your study does include human subjects and a sytematic approach, its intent is not to develop or contribute to generalizable knowledge, which therefore *does not* meet the federal definition of research as stated in 45 CFR 46.102 (d) Research - a systematic investigation, including research development, testing and evaluation, **designed to contribute to generalizable knowledge**.

Should you change the aims and activities of your project such that it would then meet the definition of human subjects research, please cease any contacts with potential human subjects until such time as you submit the project protocol to the HRRC and receive the committee's approval to proceed. Should you change the aims and activities of your project such that you are unsure if it meets the definition of human subjects research, please submit a new Non-Human Research Determination Form for review by the Office of Research Compliance and Integrity.

If you have any questions, please contact the Office of Research Integrity and Compliance at (616) 331-3197 or ric@gvsu.edu. Please include your study title and reference number in all correspondence with our office.

Respectfully,

Office of Research Compliance and Integrity

Organization IRB approval letter available upon request

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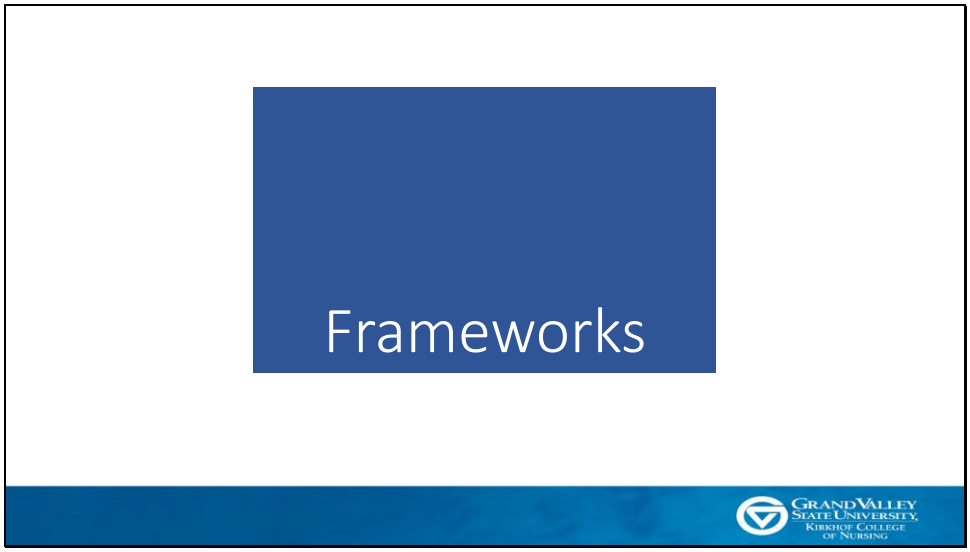
Slide 23


Frameworks
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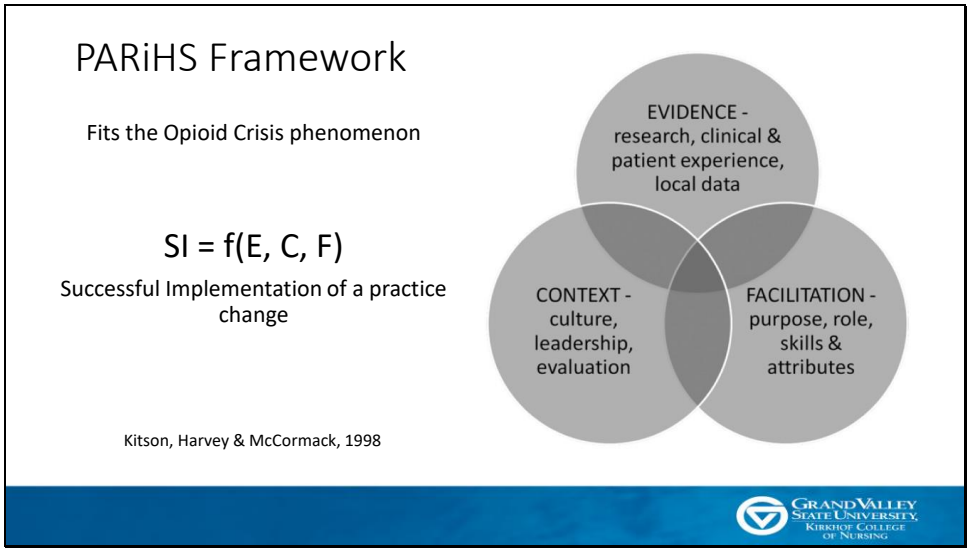
Slide 24


PARiHS Framework
Fits the Opioid Crisis phenomenon
SI = f(E, C, F)
Successful Implementation of a practice change
Kitson, Harvey & McCormack, 1998
EVIDENCE - research, clinical & patient experience, local data
CONTEXT - culture, leadership, evaluation
FACILITATION - purpose, role, skills & attributes
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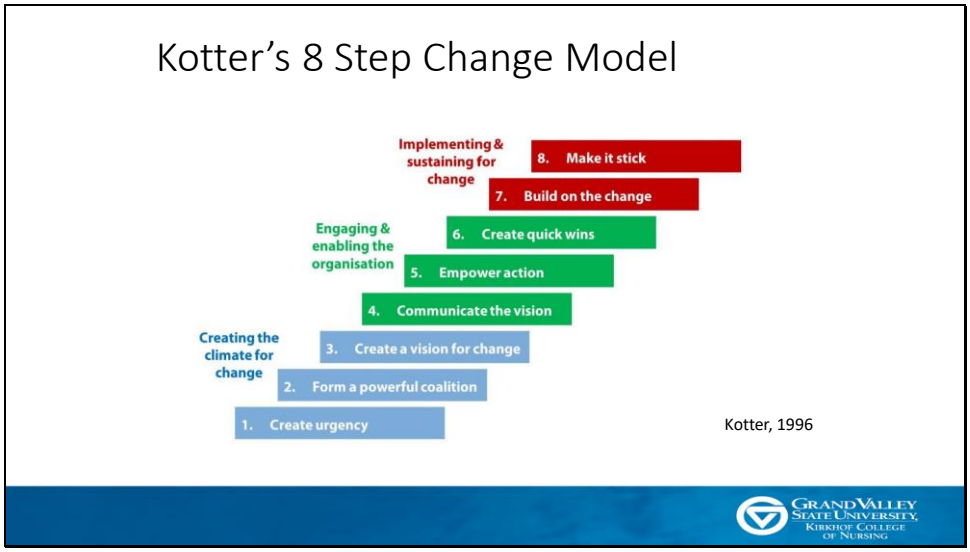
Slide 25


Kotter's 8 Step Change Model
Implementing & sustaining for change
8. Make it stick
7. Build on the change
Engaging & enabling the organisation
6. Create quick wins
5. Empower action
4. Communicate the vision
Creating the climate for change
3. Create a vision for change
2. Form a powerful coalition
1. Create urgency
Kotter, 1996
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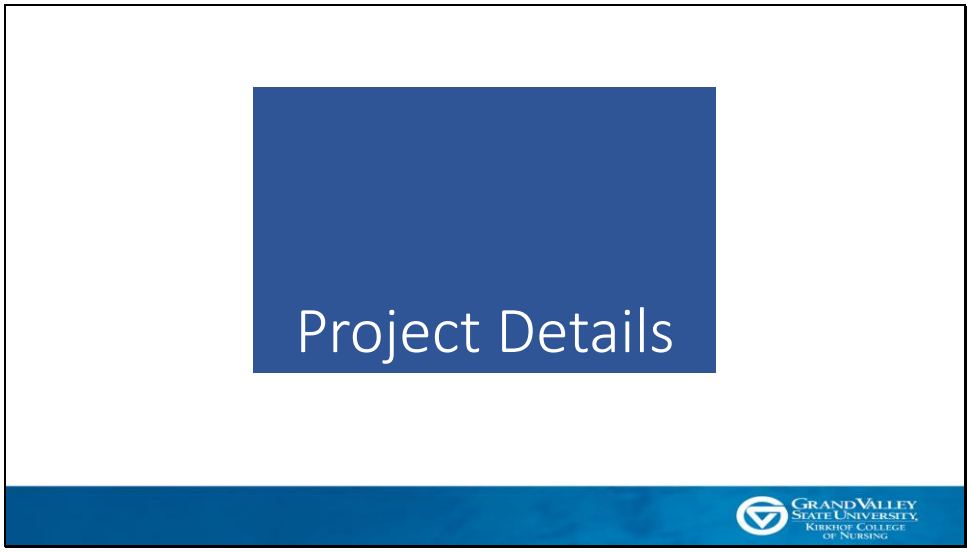
Slide 26


Project Details
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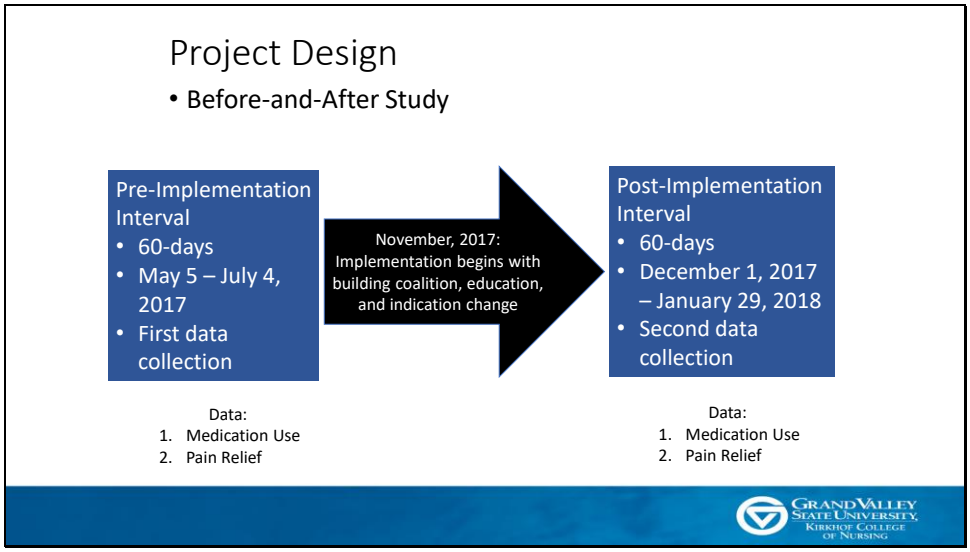
Slide 27


Project Design
• Before-and-After Study
Pre-Implementation Interval
• 60-days
• May 5 – July 4, 2017
• First data collection
November, 2017: Implementation begins with building coalition, education, and indication change
Post-Implementation Interval
• 60-days
• December 1, 2017 – January 29, 2018
• Second data collection
Data:
1. Medication Use
2. Pain Relief
Data:
1. Medication Use
2. Pain Relief
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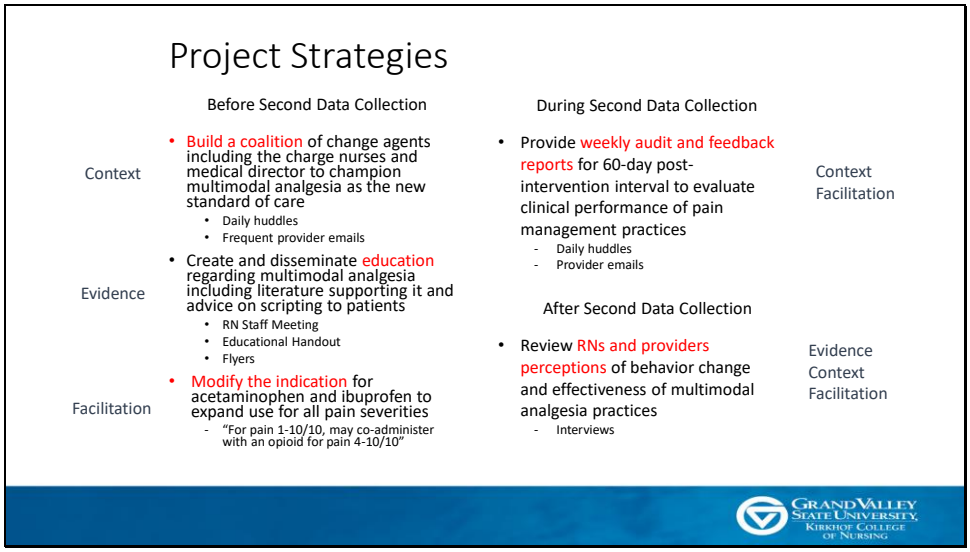
Slide 28


Project Strategies
Before Second Data Collection
During Second Data Collection
Context
Build a coalition of change agents including the charge nurses and medical director to champion multimodal analgesia as the new standard of care
Daily huddles
Frequent provider emails
Evidence
Create and disseminate education regarding multimodal analgesia including literature supporting it and advice on scripting to patients
RN Staff Meeting
Educational Handout
Flyers
Facilitation
Modify the indication for acetaminophen and ibuprofen to expand use for all pain severities
"For pain 1-10/10, may co-administer with an opioid for pain 4-10/10"
Provide weekly audit and feedback reports for 60-day post-intervention interval to evaluate clinical performance of pain management practices
Daily huddles
Provider emails
Context
Facilitation
After Second Data Collection
Review RNs and providers perceptions of behavior change and effectiveness of multimodal analgesia practices
Interviews
Evidence
Context
Facilitation
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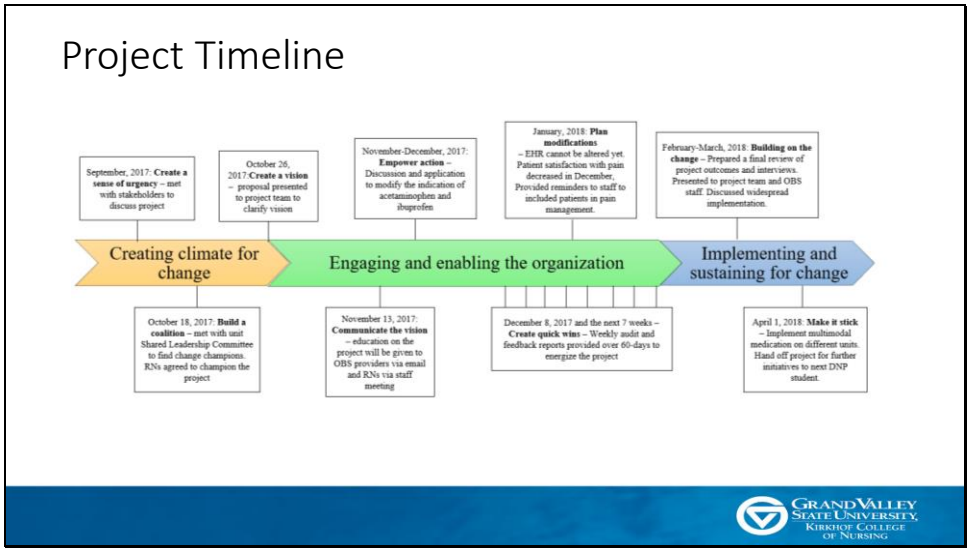
Slide 29


Project Timeline
September, 2017: Create a sense of urgency – met with stakeholders to discuss project
October 26, 2017:Create a vision – proposal presented to project team to clarify vision
November-December, 2017: Empower action – Discussion and application to modify the indication of acetaminophen and ibuprofen
January, 2018: Plan modifications – EHR cannot be altered yet. Patient satisfaction with pain decreased in December. Provided reminders to staff to included patients in pain management.
February-March, 2018: Building on the change – Prepared a final review of project outcomes and interviews. Presented to project team and OBS staff. Discussed widespread implementation.
Creating climate for change
Engaging and enabling the organization
Implementing and sustaining for change
October 18, 2017: Build a coalition – met with unit Shared Leadership Committee to find change champions. RNs agreed to champion the project
November 13, 2017: Communicate the vision – education on the project will be given to OBS providers via email and RNs via staff meeting
December 8, 2017 and the next 7 weeks – Create quick wins – Weekly audit and feedback reports provided over 60-days to energize the project
April 1, 2018: Make it stick – Implement multimodal medication on different units. Hand off project for further initiatives to next DNP student.
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Slide 30


Measures
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Slide 31

## Measuring the Strategies

| Strategies | How measured (tool, survey, variable) | When Measured | Who Measured |
|---|---|---|---|
| Building a Coalition | Checklist (discuss project at each shift meeting) | Every shift (twice daily) | Charge Nurses |
| | Interview (Medical director) | November 2017 – January 2018 | DNP Candidate |
| Education<br>RN staff meeting<br>Educational handout given to providers<br>Educational flyer for resource | Survey (RNs) | Pre/Post education | DNP Candidate |
| | Interview | Late November/Early December | DNP Candidate |
| Modification of acetaminophen and ibuprofen indication | EHR Review | December 1, 2017 – January 29, 2018 | DNP Candidate |
| Audit and Feedback | Automated Medication Dispensing System | Weekly December 1, 2017 – January 29, 2018 | Pharmacy technician; DNP Candidate |
| Behavior Change Review | Interview | After January 29, 2018 | DNP Candidate |

Slide 32

## Measuring the Project Purpose and Objective

| Purpose/Objective | How measured (tool, survey, variable | When Measured | Who Measured |
|---|---|---|---|
| • Multimodal analgesia as standard of care when opioids used<br>• Decrease Opioid-only treatment by 50% | Automated Medication Dispensing System | Pre/Post-Implementation Intervals | Pharmacy technician, DNP Candidate |

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Slide 33

## Measuring the Clinical Question

| Primary Outcomes | Operational Definition | How measured (tool, survey, variable | When Measured | Who Measured |
|---|---|---|---|---|
| Effective Pain Relief | Pain Assessment Score | EHR Review (Numerical Pain Rating Scale; 0-10) | Pre/Post Implementation Intervals | DNP Candidate |
| | Satisfaction with pain control | Patient Experience Report | Pre/Post Implementation Intervals | Press Ganey |
| Opioid Use | Opioid Reliance – ratio of opioid to non-opioid use | Automated Medication Dispensing System | Pre/Post Implementation Intervals | Pharmacy technician; DNP Candidate |
| | Opioid Consumption – Morphine Equivalent Dose | Automated Medication Dispensing System | Pre/Post Implementation Intervals | Pharmacy technician; DNP Candidate |

Slide 34


Results
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Slide 35

## Evaluation of Strategies

| | How measured | When measured | Result |
|---|---|---|---|
| **Build a Coalition** | Checklist tool (Charge nurses) | Every shift (Twice daily) | Multimodal analgesia was discussed at 57.4% of shifts (n = 58) |
| | Interview (Medical director) | November 2017 – January 2018 | 3 provider emails<br>1 meeting (December) |
| **Education**<br>• **RN staff meeting**<br>• **Educational handout for providers**<br>• **Educational flyer for resource** | Pre/Post-test (RNs) | Pre/post education | 57% (n = 19) RNs attended<br>Pre-test: 67% average score<br>Post-test: 100% average score |
| | Survey (Providers) | November 15 – December 1 | 83.3% (n = 10) PAs/NPs received handout<br>46.6% (n = 7) physicians received handout<br>100% (n = 9) surveyed agreed with project |
| **Modification of acetaminophen and ibuprofen order indication** | Unable to be completed<br>Delay on modifications due to the new EHR<br>Interest in changing the indication organization-wide | | |

Slide 36

## Evaluation of Strategies

| Intervention | How measured | When measured | Result |
|---|---|---|---|
| **Audit and feedback** | Automated medication dispensing system report | December 1, 2017 – January 29, 2018 | Weekly opioid-only therapy was consistently 50% lower than pre-implementation data |
| **Behavior Change Review** | Interview | February, 2018 | RN Themes:<br>• "Once I explained multimodal to patients, most of them agreed."<br>• "I changed my practices after learning about multimodal analgesia"<br>• "Multimodal seemed to help some patients more than others."<br>Provider Themes:<br>• "I always prescribed a variety of pain medications"<br>• "I treat patients based on their clinical presentation" |

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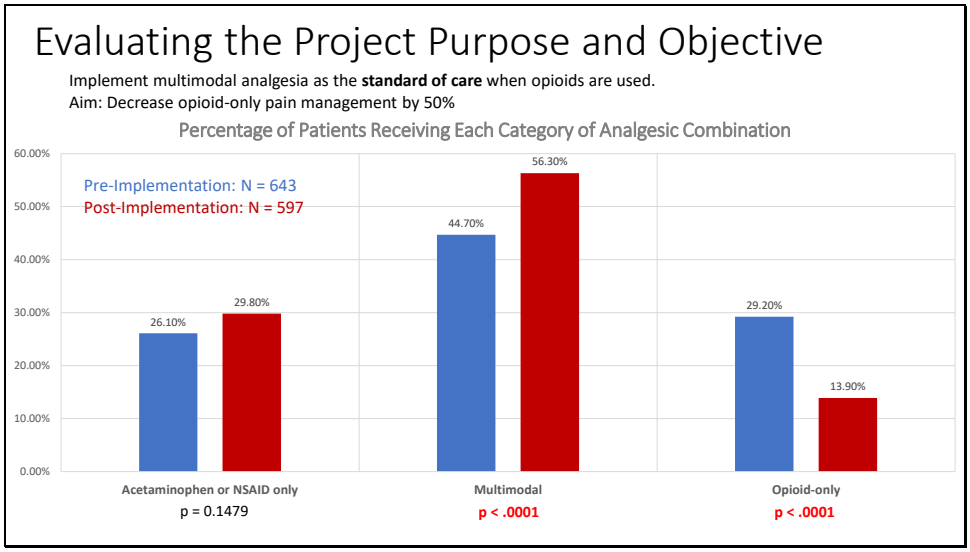
Slide 37


Evaluating the Project Purpose and Objective
Implement multimodal analgesia as the **standard of care** when opioids are used.
Aim: Decrease opioid-only pain management by 50%
Percentage of Patients Receiving Each Category of Analgesic Combination
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Pre-Implementation: N = 643
Post-Implementation: N = 597
26.10%
29.80%
44.70%
56.30%
29.20%
13.90%
Acetaminophen or NSAID only
p = 0.1479
Multimodal
p < .0001
Opioid-only
p < .0001

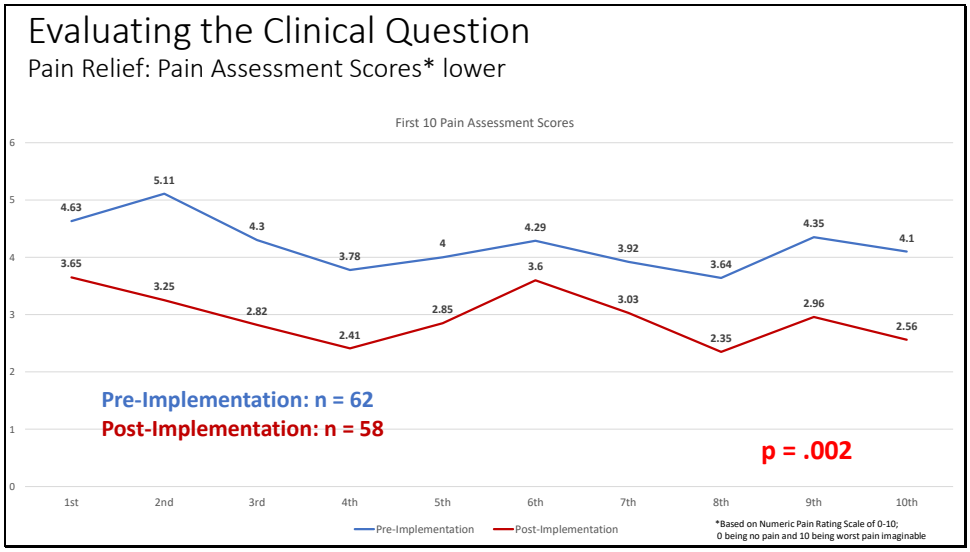
Slide 38

## Evaluating the Clinical Question

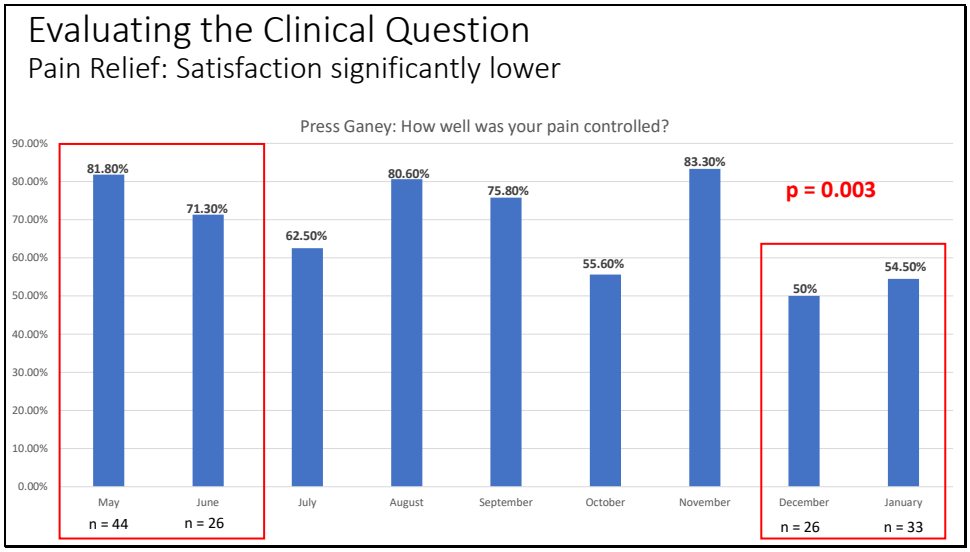
Pain Relief: EHR Chart Review

| Demographics | Pre-Implementation N = 62 | Post-Implementation N = 58 | p-value |
|---|---|---|---|
| | % (n) | % (n) | |
| Multimodal Analgesia used | 28 (45.16%) | 31 (53.45%) | 0.36 |
| Opioid-only Analgesia used | 17 (27.42%) | 8 (13.79%) | 0.07 |
| Acetaminophen or NSAID only | 17 (27.42%) | 19 (32.76%) | 0.52 |
| Non-Opioid was Ordered (Yes) | 47 (75.81%) | 51 (87.93%) | 0.10 |
| If Ordered, Non-Opioid was Used (Yes) | 28 (60.87%) | 39 (76.47%) | 0.08 |
| | Median [IQR] [Range] | Median [IQR] [Range] | |
| MME | 15 [30] [0 – 135] | 10 [26] [0 – 168.5] | 0.50 |
| | Mean ± SD [Range] | Mean ± SD [Range] | |
| Age (years) | 51.27 ± 19.76 [18 – 99] | 58.81 ± 19.13 [18 – 93] | **0.04** |
| Average Pain Assessment Score | 4.21 ± 2.27 [0 – 10] | 3.00 ± 1.91 [0 – 10] | **.002** |

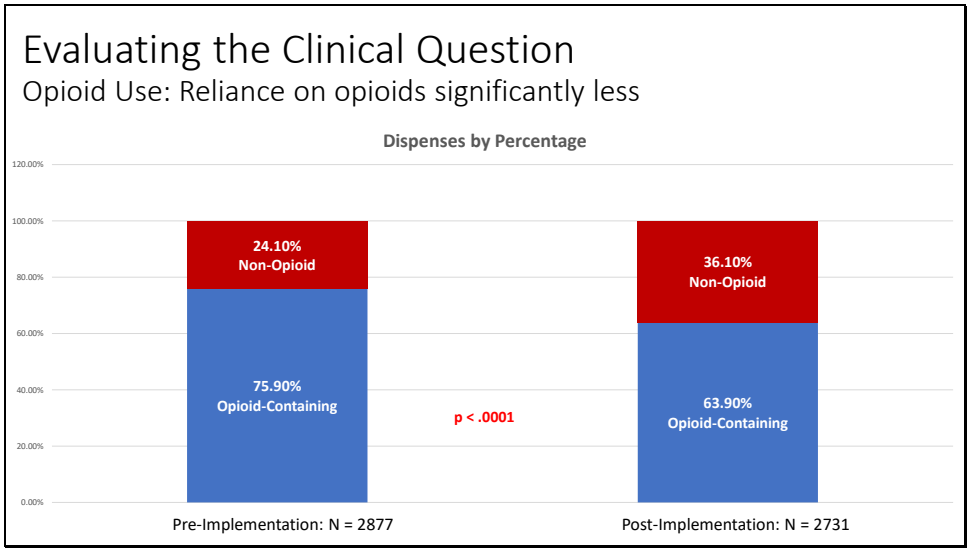
Slide 39


Evaluating the Clinical Question
Pain Relief: Pain Assessment Scores* lower
First 10 Pain Assessment Scores
6
5
4
3
2
1
0
4.63
5.11
4.3
3.78
4
4.29
3.92
3.64
4.35
4.1
3.65
3.25
2.82
2.41
2.85
3.6
3.03
2.35
2.96
2.56
Pre-Implementation: n = 62
Post-Implementation: n = 58
p = .002
1st
2nd
3rd
4th
5th
6th
7th
8th
9th
10th
Pre-Implementation
Post-Implementation
*Based on Numeric Pain Rating Scale of 0-10;
0 being no pain and 10 being worst pain imaginable

Slide 40


Evaluating the Clinical Question
Pain Relief: Satisfaction significantly lower
Press Ganey: How well was your pain controlled?
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
81.80%
71.30%
62.50%
80.60%
75.80%
55.60%
83.30%
50%
54.50%
p = 0.003
May
June
July
August
September
October
November
December
January
n = 44
n = 26
n = 26
n = 33

Slide 41


Evaluating the Clinical Question
Opioid Use: Reliance on opioids significantly less
Dispenses by Percentage
120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
24.10%
Non-Opioid
75.90%
Opioid-Containing
p < .0001
36.10%
Non-Opioid
63.90%
Opioid-Containing
Pre-Implementation: N = 2877
Post-Implementation: N = 2731

Slide 42

## Evaluating the Clinical Question

Opioid Use: Consumption not significantly different

| | Pre-Implementation Participants Receiving an Opioid N = 464 | Post-Implementation Participants Receiving an Opioid N = 404 | |
|---|---|---|---|
| | **Median [IQR] [Range]** | **Median [IQR] [Range]** | p-value |
| Median MED | 20 [35] [2 – 527.5] | 20 [30] [1 – 392] | 0.6 *Mann Whitney U test |

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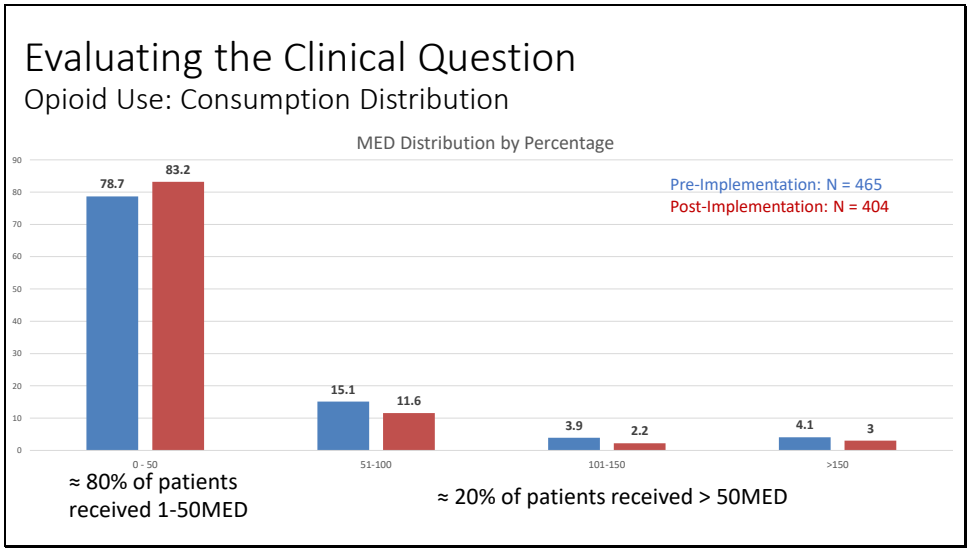
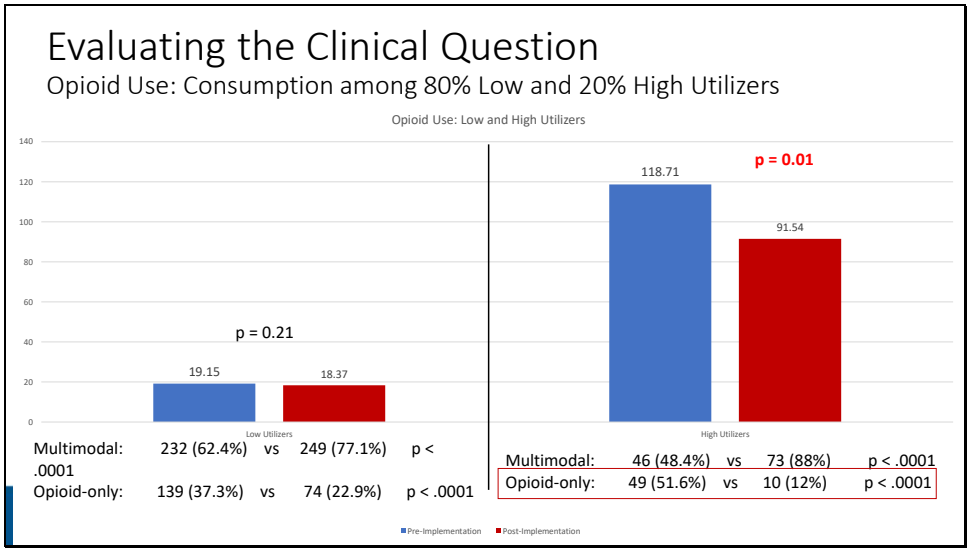
Slide 43


Evaluating the Clinical Question
Opioid Use: Consumption Distribution
MED Distribution by Percentage
90
80
70
60
50
40
30
20
10
0
78.7
83.2
15.1
11.6
3.9
2.2
4.1
3
0 - 50
51-100
101-150
>150
Pre-Implementation: N = 465
Post-Implementation: N = 404
≈ 80% of patients received 1-50MED
≈ 20% of patients received > 50MED

Slide 44


Evaluating the Clinical Question
Opioid Use: Consumption among 80% Low and 20% High Utilizers
Opioid Use: Low and High Utilizers
140
120
100
80
60
40
20
0
p = 0.21
19.15
18.37
Low Utilizers
118.71
p = 0.01
91.54
High Utilizers
Multimodal: 232 (62.4%) vs 249 (77.1%) p < .0001
Opioid-only: 139 (37.3%) vs 74 (22.9%) p < .0001
Multimodal: 46 (48.4%) vs 73 (88%) p < .0001
Opioid-only: 49 (51.6%) vs 10 (12%) p < .0001
Pre-Implementation
Post-Implementation

Slide 45


Discussion
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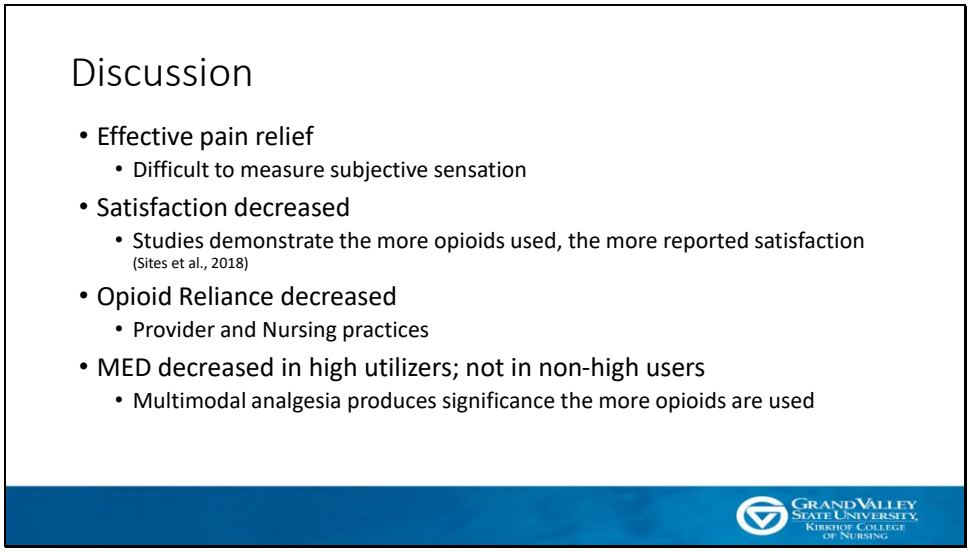
Slide 46


Discussion
• Effective pain relief
• Difficult to measure subjective sensation
• Satisfaction decreased
• Studies demonstrate the more opioids used, the more reported satisfaction
(Sites et al., 2018)
• Opioid Reliance decreased
• Provider and Nursing practices
• MED decreased in high utilizers; not in non-high users
• Multimodal analgesia produces significance the more opioids are used
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Slide 47

## Limitations

- Length of stay: *Median* 18 hours
  - Low utilizers vs High utilizers
- Current Opioid Users
  - Not consistently assessed….yet
- External Environment
  - Bias by providers, RNs and/or patients?


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Slide 48

## Implications for Practice

- Acute Nociceptive Pain
- Engaged staff is crucial
- Limiting unnecessary opioid use could decrease perpetuation of opioid crisis in certain settings

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Slide 49

## Conclusions

Multimodal analgesia appears to provide effective pain relief while also reducing reliance on opioids and consumption in high utilizers but does reduce patient satisfaction in certain settings .


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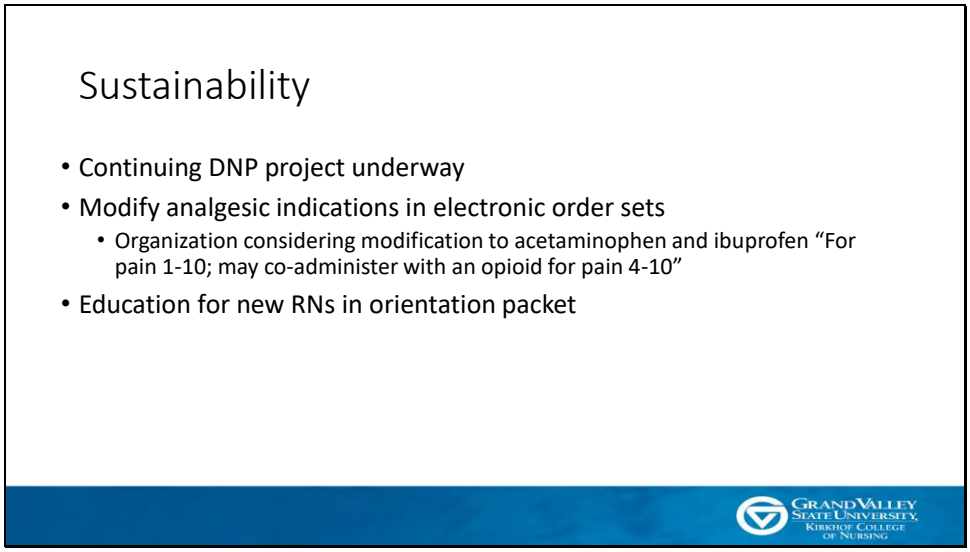
Slide 50

# Budget

Potential cost mitigation:
$31,483.00 the first year

| Initial Cost: Evidence-based Pain Management | |
|---|---|
| **Transitioning focus from opioids to multimodal analgesia for pain management** | |
| **Revenue** | |
| Project Manager Time (in-kind donation) | 2,820.00 |
| Team Member Time: | |
| Statistician (in-kind donation) | 100.00 |
| Presidential Research Grant: White Paper for organization, educational flyers, binder to leave on unit for next step | 114.80 |
| Cost mitigation (Prevention of 1 hospitalization and 1 ED visit related to opioid overdose per year) | |
| 3.8-day Hospitalization (1-year period) | 29,497.00 |
| Emergency department visit (1-year period) | 3,640.00 |
| **TOTAL INCOME** | 36,171.80 |
| **Expenses** | |
| Project Manager Time (in-kind donation) | 2,820.00 |
| Statistician (in-kind donation) | 100.00 |
| Color-printed Educational Flyers | 82.80 |
| Professionally Printed White Paper | 25.00 |
| Binder with steps for sustainability | 7.00 |
| Team Member Time: | |
| Registered Nurses (extra time spent in staff meeting to be educated on pilot project) | 225.00 |
| Educate NPs and PAs (time spent reading education on pilot project) | 490.00 |
| Educate Physicians (time spent reading education on pilot project) | 655.00 |
| Pharmacist Consultation (one-time cost occurrence) | 60.00 |
| Clinical Nurse Specialist Consultation (one-time cost occurrence) | 96.00 |
| Pharmacy Technician generating weekly report (8-time occurrence) | 128.00 |
| **TOTAL EXPENSES** | 4,688.80 |
| **OPERATING INCOME** | 31,483.00 |

Slide 51


Sustainability
• Continuing DNP project underway
• Modify analgesic indications in electronic order sets
• Organization considering modification to acetaminophen and ibuprofen "For pain 1-10; may co-administer with an opioid for pain 4-10"
• Education for new RNs in orientation packet
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Slide 52

## Dissemination

Within Organization

- Unit Presentation
- Central Shared Leadership Presentation
- Organization Poster Presentation
- Organization Opioid Prescribing and Pain Management Steering Committee
- Organization Nursing Research Council

Beyond Organization

- KCON CEU Event
- MICNP Annual Conference
- Sigma Theta Tau
- Seeking Publication of Literature Review and Manuscript
- 3MT® (GVSU and Regional Competition)
- Inclusion in chapter of *The DNP Scholarly Project: A Framework for Success*

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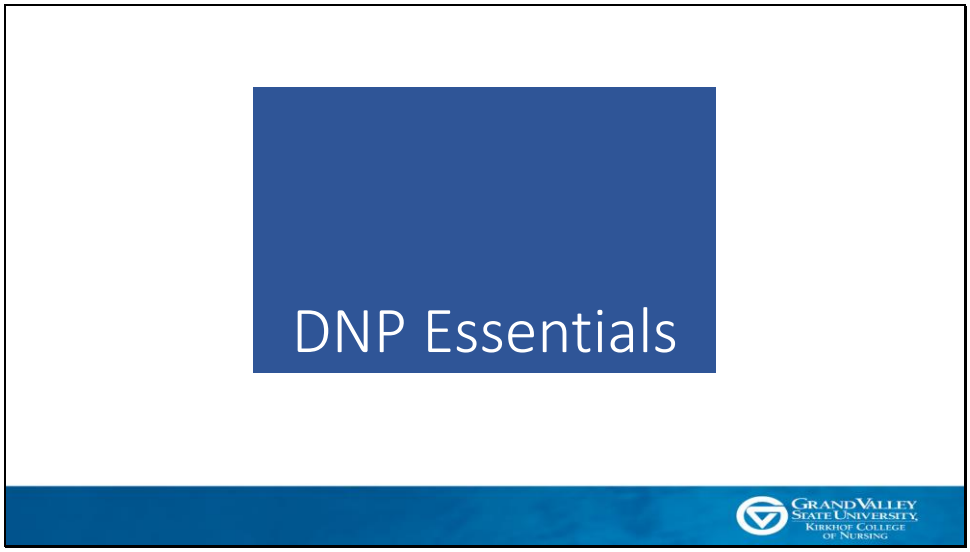
Slide 53


DNP Essentials
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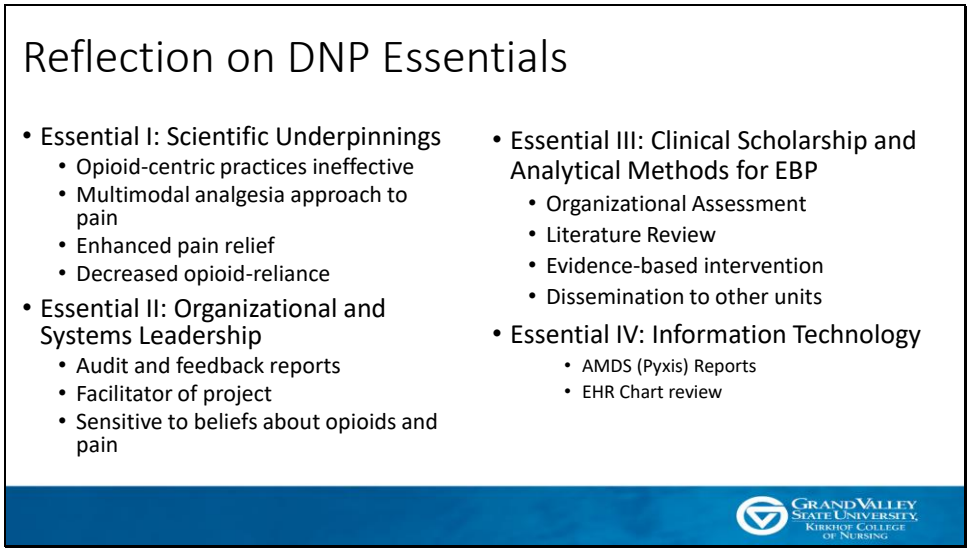
Slide 54


Reflection on DNP Essentials
• Essential I: Scientific Underpinnings
• Opioid-centric practices ineffective
• Multimodal analgesia approach to pain
• Enhanced pain relief
• Decreased opioid-reliance
• Essential II: Organizational and Systems Leadership
• Audit and feedback reports
• Facilitator of project
• Sensitive to beliefs about opioids and pain
• Essential III: Clinical Scholarship and Analytical Methods for EBP
• Organizational Assessment
• Literature Review
• Evidence-based intervention
• Dissemination to other units
• Essential IV: Information Technology
• AMDS (Pyxis) Reports
• EHR Chart review
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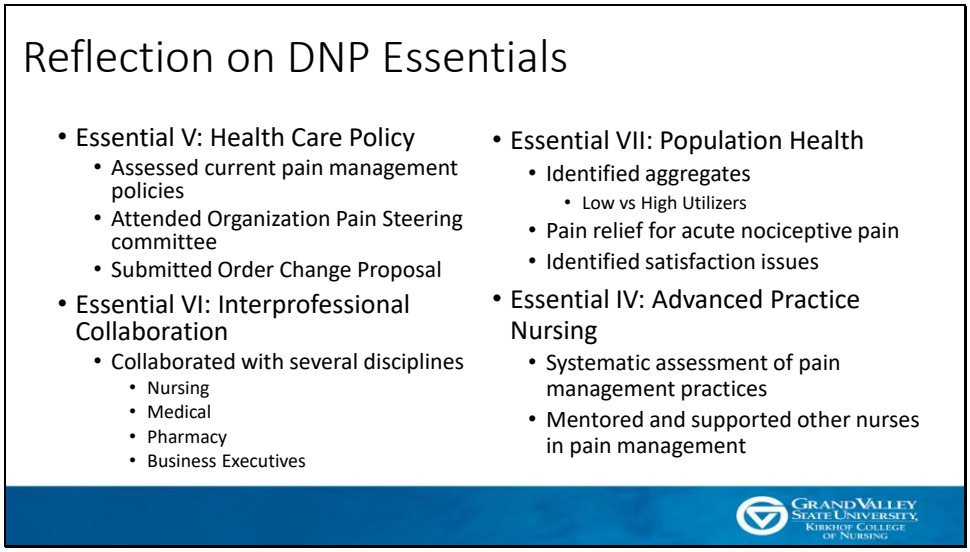
Slide 55


Reflection on DNP Essentials
• Essential V: Health Care Policy
• Assessed current pain management policies
• Attended Organization Pain Steering committee
• Submitted Order Change Proposal
• Essential VI: Interprofessional Collaboration
• Collaborated with several disciplines
• Nursing
• Medical
• Pharmacy
• Business Executives
• Essential VII: Population Health
• Identified aggregates
• Low vs High Utilizers
• Pain relief for acute nociceptive pain
• Identified satisfaction issues
• Essential IV: Advanced Practice Nursing
• Systematic assessment of pain management practices
• Mentored and supported other nurses in pain management
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Slide 56


Thank you!
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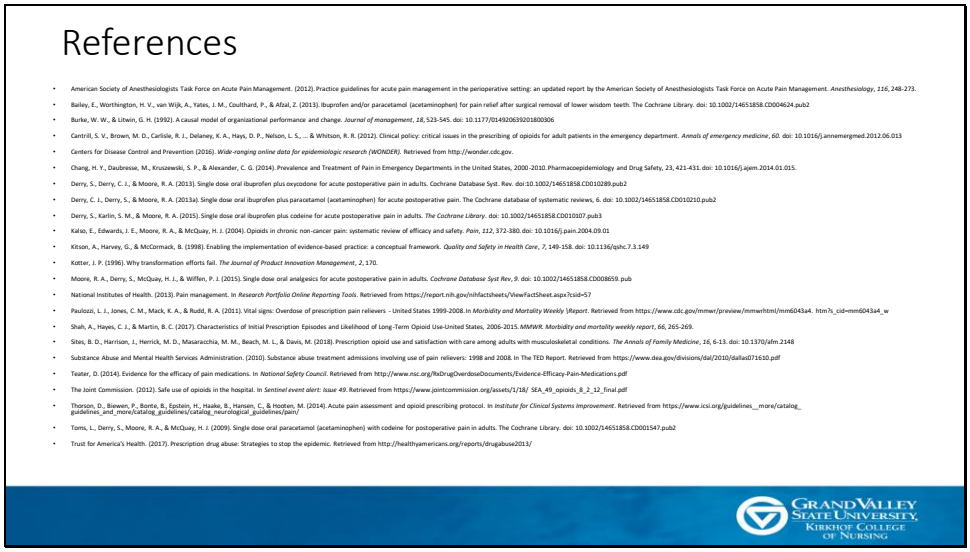
Slide 57



References


- American Society of Anesthesiologists Task Force on Acute Pain Management. (2012). Practice guidelines for acute pain management in the perioperative setting: an updated report by the American Society of Anesthesiologists Task Force on Acute Pain Management. *Anesthesiology*, *116*, 248-273.
- Bailey, E., Worthington, H. V., van Wijk, A., Yates, J. M., Coulthard, P., & Afzal, Z. (2013). Ibuprofen and/or paracetamol (acetaminophen) for pain relief after surgical removal of lower wisdom teeth. The Cochrane Library. doi: 10.1002/14651858.CD004624.pub2
- Burke, W. W., & Litwin, G. H. (1992). A causal model of organizational performance and change. *Journal of management*, *18*, 523-545. doi: 10.1177/014920639201800306
- Cantrill, S. V., Brown, M. D., Carlisle, R. J., Delaney, K. A., Hays, D. P., Nelson, L. S., ... & Whitson, R. R. (2012). Clinical policy: critical issues in the prescribing of opioids for adult patients in the emergency department. *Annals of emergency medicine*, *60*. doi: 10.1016/j.annemergmed.2012.06.013
- Centers for Disease Control and Prevention (2016). *Wide-ranging online data for epidemiologic research (WONDER).* Retrieved from http://wonder.cdc.gov.
- Chang, H. Y., Daubresse, M., Kruszewski, S. P., & Alexander, C. G. (2014). Prevalence and Treatment of Pain in Emergency Departments in the United States, 2000-2010. Pharmacoepidemiology and Drug Safety, 23, 421-431. doi: 10.1016/j.ajem.2014.01.015.
- Derry, S., Derry, C. J., & Moore, R. A. (2013). Single dose oral ibuprofen plus oxycodone for acute postoperative pain in adults. Cochrane Database Syst. Rev. doi:10.1002/14651858.CD010289.pub2
- Derry, C. J., Derry, S., & Moore, R. A. (2013a). Single dose oral ibuprofen plus paracetamol (acetaminophen) for acute postoperative pain. The Cochrane database of systematic reviews, 6. doi: 10.1002/14651858.CD010210.pub2
- Derry, S., Karlin, S. M., & Moore, R. A. (2015). Single dose oral ibuprofen plus codeine for acute postoperative pain in adults. *The Cochrane Library*. doi: 10.1002/14651858.CD010107.pub3
- Kalso, E., Edwards, J. E., Moore, R. A., & McQuay, H. J. (2004). Opioids in chronic non-cancer pain: systematic review of efficacy and safety. *Pain*, *112*, 372-380. doi: 10.1016/j.pain.2004.09.01
- Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence-based practice: a conceptual framework. *Quality and Safety in Health Care*, *7*, 149-158. doi: 10.1136/qshc.7.3.149
- Kotter, J. P. (1996). Why transformation efforts fail. *The Journal of Product Innovation Management*, *2*, 170.
- Moore, R. A., Derry, S., McQuay, H. J., & Wiffen, P. J. (2015). Single dose oral analgesics for acute postoperative pain in adults. *Cochrane Database Syst Rev*, *9*. doi: 10.1002/14651858.CD008659. pub
- National Institutes of Health. (2013). Pain management. In *Research Portfolio Online Reporting Tools*. Retrieved from https://report.nih.gov/nihfactsheets/ViewFactSheet.aspx?csid=57
- Paulozzi, L. J., Jones, C. M., Mack, K. A., & Rudd, R. A. (2011). Vital signs: Overdose of prescription pain relievers - United States 1999-2008. In *Morbidity and Mortality Weekly \Report*. Retrieved from https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6043a4. htm?s_cid=mm6043a4_w
- Shah, A., Hayes, C. J., & Martin, B. C. (2017). Characteristics of Initial Prescription Episodes and Likelihood of Long-Term Opioid Use-United States, 2006-2015. *MMWR. Morbidity and mortality weekly report*, *66*, 265-269.
- Sites, B. D., Harrison, J., Herrick, M. D., Masaracchia, M. M., Beach, M. L., & Davis, M. (2018). Prescription opioid use and satisfaction with care among adults with musculoskeletal conditions. *The Annals of Family Medicine*, *16*, 6-13. doi: 10.1370/afm.2148
- Substance Abuse and Mental Health Services Administration. (2010). Substance abuse treatment admissions involving use of pain relievers: 1998 and 2008. In The TED Report. Retrieved from https://www.dea.gov/divisions/dal/2010/dallas071610.pdf
- Teater, D. (2014). Evidence for the efficacy of pain medications. In *National Safety Council*. Retrieved from http://www.nsc.org/RxDrugOverdoseDocuments/Evidence-Efficacy-Pain-Medications.pdf
- The Joint Commission. (2012). Safe use of opioids in the hospital. In *Sentinel event alert: Issue 49*. Retrieved from https://www.jointcommission.org/assets/1/18/ SEA_49_opioids_8_2_12_final.pdf
- Thorson, D., Biewen, P., Bonte, B., Epstein, H., Haake, B., Hansen, C., & Hooten, M. (2014). Acute pain assessment and opioid prescribing protocol. In *Institute for Clinical Systems Improvement*. Retrieved from https://www.icsi.org/guidelines__more/catalog_ guidelines_and_more/catalog_guidelines/catalog_neurological_guidelines/pain/
- Toms, L., Derry, S., Moore, R. A., & McQuay, H. J. (2009). Single dose oral paracetamol (acetaminophen) with codeine for postoperative pain in adults. The Cochrane Library. doi: 10.1002/14651858.CD001547.pub2
- Trust for America's Health. (2017). Prescription drug abuse: Strategies to stop the epidemic. Retrieved from http://healthyamericans.org/reports/drugabuse2013/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