Summer 8-30-2017

ANALYZING THE EFFECTIVINESS OF A PRESCRIPTION DRUG MONITORING PROGRAM TARGETING AT-RISK OPIOID ABUSE PATIENTS

Treadway Childs
University of New Mexico

Treadway Childs
Candidate

School of Public Administration
Graduate Department

This thesis is approved, and it is acceptable in quality and form for publication:

Approved by the Thesis Committee:

Kate Cartwright, PhD, MPH Chairperson

Nicholas Edwardson, PhD, MS

Kun Huang, PhD

ANALYZING THE EFFECTIVINESS OF A PRESCRIPTION DRUG MONITORING PROGRAM TARGETING AT-RISK OPIOID ABUSE PATIENTS

BY

TREADWAY CHILDS

PREVIOUS DEGREES
B.A., COMMUNICATION, UNIVERSITY OF NEW MEXICO, 2015
B.A., PSYCHOLOGY, UNIVERSITY OF NEW MEXICO, 2015

THESIS

Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts
PUBLIC ADMINISTRATION

The University of New Mexico
Albuquerque, New Mexico

JULY, 2017

Acknowledgments

I would like to acknowledge Dr. Kate Cartwright, my thesis chair, for continuing to hound me over the last few months. Her assistance and can-do attitude made this project possible and I am truly thankful for her time and effort. I also thank my committee members, Dr. Kun Huang, and Dr. Nick Edwardson for their time during the summer.

This project also would not have been possible without the permission, guidance, and assistance of Dr. Eric Ketcham. I am thankful for the access to the data and the opportunity to work with meaningful data. Also, I would like to thank everyone on Dr. Ketcham's team who helped me throughout this process.

ANALYZING THE EFFECTIVINESS OF PRESCRIPTION DRUG MONITORING PROGRAM TARGETING AT-RISK OPIOID ABUSE PATIENTS

by

Treadway Childs

B.A., Communication, University of New Mexico, 2015
B.A., Psychology, University of New Mexico, 2015

ABSTRACT

The effectiveness of a prescription drug monitoring program in coordination with a prescription opioid recidivism program was examined at a semi-rural community hospital. Patients were identified by a multi-disciplinary committee to be at-risk for opioid misuse or abuse, and were denied prescription opioids. Patients were considered eligible for the program if they had over 12 emergency department visits in the previous 12 months, or 6 visits in the previous 6 months, depending on how long the hospital had records on a patient. Patients who were placed in the prescription opioid recidivism program could not receive opioids at this hospital. The number of visits these patients had in subsequent 12 month periods was examined. Of the 298 patients enrolled in the recidivism program, 95% of them would see a reduction in the number of emergency department visits made in the 12 months following enrollment in the recidivism program. This resulted in a savings of $2.5 million in operations for the hospital. The use of prescription drug monitoring programs to combat the opioid epidemic shows potential as a solution, but needs to be examined further to determine how effective these systems can be.

TABLE OF CONTENTS

Introduction

The negative side effects and consequences of popular opioid medications are a grave concern of the general population of the United States of America. Recently, the amount of opioids that are being prescribed in the United States is skyrocketing and a greater percentage of the population is being effected by the drug (Jones, Mack, & Paulozzi, 2010). The United States alone consumes over three-fourths of the world's opioids (American Society of Interventional Pain Physicians, n.d.). In turn, the amount of misuse, abuse, and deaths coming from opioid use is also on the rise. Locally, New Mexico had the 8th highest drug overdose mortality rate in the country at 25.3, and a nearly a third of these deaths occur to the under 18 population in 2015 (Center for Disease Control, 2017). In 2014, 40 percent of the overdose deaths were attributed to prescription opioid medications (New Mexico Epidemiology, 2017).

In addition to this, individuals who are seeking an opioid prescription are creating inefficiencies in hospitals, clinics, and doctor offices around the country. Emergency care providers are visited by these opioid-seeking individuals more often than other practitioners (Smith, et al., 2015). With the nature of emergency medicine, it can be difficult for these providers to accurately provide care to patients. For example, anyone can come through the doors, and they are legally obligated to receive treatment, a factor not seen in primary care. Because of this, emergency practitioners are required to use their time and ability to provide treatment for the patients that enter the emergency department (ED). However, receiving treatment may not be the goal of all patients. Whether conscious of it or not, patients engage in health care with a certain expectation, and the failure of the provider to meet these expectations can have negative effects on the

patient, and their perceptions of the providers (Lateef, 2011). Some patients are exclusively looking for an opioid prescription and will try until they accomplish their goal and receive the desired prescription. This is a behavior known as doctor shopping (Sansone & Sansone, 2012). If opioid-seeking patients continue to burden the health care system, and detract from the care of other patients, the opioid epidemic will cause further negative economic and health issues. By recognizing these issues early, and acting to eliminate them, administrators can create policies that rid their organizations of inefficiencies, while also being a step ahead when it comes to regulations.

For example, without proper systems in place, patients can go from doctor to doctor, hospital to hospital, until they are given the prescription they are looking for. Every doctor-shopping visit reduces the benefit other patients, who have actual medical needs, can experience and gain from their providers (Norton et al., 2011). However, systems can be put in place to combat doctor shopping and opioid seekers. One of these systems used to decrease doctor shopping, among other things, involves using electronic health records and prescription drug monitoring programs.

Prescription drug monitoring programs (PDMPs) can inform doctors, administrators, pharmacists, review boards, and other entities on the amount of opioids that are being prescribed, as well as when they were prescribed (John Hopkins Bloomberg School of Public Health 2015). Another system that can be implemented would be a Health Information Exchange (HIE). HIEs can be used to increase the effectiveness of treatment by having a thorough and timely sharing of records. The benefit of HIEs is they can share information across hospitals and clinics that have no affiliations (Furukawa, Patel, Charles, Swain, & Mostashari, 2013). This information can

inform providers that individuals have already been prescribed a medication and should not be in need of further medication at the current time. Also, these programs can inform the prescribing provider that the patient may need substance abuse treatment due to the number of visits that are deemed opioid seeking (John Hopkins Bloomberg School of Public Health 2015). Gathering, centralizing, and disseminating this information, can be used to determine if these patients are displaying behaviors that are associated with opioid abuse, doctor shopping, and drug addiction. Also, the monitoring programs can identify doctors that are overly liberal with their prescription pads. By using electronic health records, this prescription information can be kept up-to-date and utilized in real time. This is a benefit to hospitals as they can better the behaviors of their doctors and eliminate unnecessary and expensive visits.

However, PDMPs were accessed in fewer than a quarter of the cases in which an opioid was prescribed, which negates the possible benefits of the systems (John Hopkins Bloomberg School of Public Health 2015). This an example of administrators not using existing systems to eliminate waste and improve health outcomes for patients of their organizations. One of the complaints on the PDMPs is the amount of time the programs take to access and utilize. Given these programs are most useful in the emergency setting, where time is more limited than compared to primary care visits, it is essential for administrators to properly create systems that allow the efficient use of PDMPs and electronic health records.

Research question: What effect does a PDMP have on the number of unnecessary visits to a hospital's emergency department?

Literature Review

History of Opioids

In Ancient Greece, many pain management practices stemmed from the work of physician Galen. Galen makes reference to "Olympic Victor's Dark Ointment" which he stated could be used for the treatment of pain and swelling (Harrison, Hansen, & Bartels, 2012). This ointment was opioid based and would form a patch when applied to the skin. This pain intervention has been shown to be effective in modern times and could provide information into improving the current methods of pain management (Harrison, et al., 2012). In fact, because the study showing the effectiveness of the patches was completed on mice, and the human body consists of a greater amount of hair follicles than a mouse, the effects could be greater for humans. When applied locally, modern patches have shown to have a pain-relieving effect, and provide a more controlled and direct mean of dosing (Harrison, et al., 2012). Not only have opioids been shown to be effective in the reduction of pain, but they can also be an effective tool in the wound healing process.

If the delivery of morphine, or other opioids can be improved, opioids could become a more comprehensive method to the treatment of both pain and wound healing (Harrison, et al., 2012). Also, the localization of the patch could improve the effectiveness of the medication, allowing for smaller doses, which would likely reduce the motivation of some opioid seekers. Hospital administrators should be wearied of this finding as the required use of patches, when possible, could reduce the number of unnecessary visits their facility experiences. Also, because the patches contain a decreased amount of medicine, there would be less cost savings as less of the drug is being purchased.

Throughout time, innovations and new application of opioids have been explored.

In the sixteenth century, laudanum, which is an opium distributed in an alcoholic solution, was used as a painkiller. Laudanum was introduced by Paracelsus and the pills were called "Stones of Immortality", and even though they were prescribed as painkillers, it is clear the euphoric effects have always been recognized (Public Broadcasting Service, 1998). This aligns with the origins of the plant, as the first mention of opioids comes from the Sumerians who referred to plant as "Hul Gil", or the "joy plant" (Brownstein, 1993; Public Broadcasting Service, 1998). Then, the first-time morphine was extracted from opium, was in the early nineteenth century (Drug Free World, n.d.; Brownstein, 1993). Morphine was used heavily as a pain killer during the Civil War, with the result of many soldiers becoming addicted to the medication. A few decades later, Jean-Pierre Robiquet isolated codeine from opium in an attempt to replace raw opium in medicine (Drug Free World, n.d.).

Today, codeine is mostly used as a cough remedy prepared as a liquid medicine. By the early nineteenth century, the British dependence of opioids was at an all-time high and the recreational use was on the rise. There was even an "Opium War" in 1839 as the British sent warships to the coast of China, this after China attempted to reduce the amount of opioids on the market. In 1874, in an attempt to find a less addictive form of morphine, chemists created heroin (Drug Free World, n.d.; Brownstein, 1993). This drug would end up being twice as powerful as morphine, and the number of individuals addicted to this substance would soon rise (Brownstein, 1993). In response to the rising levels of opioid use, abuse, and addiction, the United States Congress banned opium in 1905 (Drug Free World, n.d.).

In a similar attempt as the chemists who created heroin, German scientists Max

Bockmuhl and Gustav Ehrhart were looking for a drug with less addiction potential that could be used easily during surgery. This led to the creation of methadone, which is believed to be even more addictive than either of the previously existing morphine or heroin (Drug Free World, n.d.; Brownstein, 1993). New opioid medication has continued to be developed, as the United States saw the creation of Vicodin, OxyCotin, and Percocet between 1984 and 1999 (Drug Free World, n.d.). These are all synthetic opiates that create a response similar to how the body responds to the release of its own natural pain killers. While the prescription opioid market was seeing innovation and increases in sales, the illegal opium market was also on the rise. This was evidenced as Southeast Asia was producing 2,500 tons every year (Drug Free World, n.d.). With opioids, in many forms, being a part of human society and history it is clear we have a reliance on the chemical, and it does not appear to be diminishing. Given the mishaps in the attempt to find an alternative method of administration, it is clear we do not understand the chemical either. This point is made even clearer when examining the misuse and abuse humans have engaged in with the drug for generations. With an abundance on the varieties of opioids, and a plethora of patients, the amount of strain opioids create on the health care system has to be examined.

Opioids in Modern Medicine

While the chemical has been around for centuries, the distribution and use of opioids are creating original problems in the modern society we live in. Visits to the emergency department are more expensive for the patient, as well as the provider. The cost of the average primary care visit for a new, and uninsured, patient is $160 (Saloner, Polsky, Kenney, Hempstead, & Rhodes, 2015). In comparison, the median visit to an

emergency department will cost $1,233 (Caldwell, Srebotnjak, Wang, & Hsia, 2013). There are many programs and initiatives created by providers to help citizens understand what injuries, or complications, should be brought to an emergency department, and what ailments are not serious enough for this level of care. However, it has been determined that around 37% of all emergency department visits are unnecessary and non-urgent (Uscher-Pines, Pines, Kellerman, Gillen, & Mehrotra, 2013). These unnecessary visits can lead to issues in the healthcare system including, but not limited to, excessive testing, treatment, and spending (Uscher-Pines, et al., 2013). This misuse of the health care system can also lead to a fracturing of the patient-provider relationship (Uscher-Pines, et al., 2013). Administrators need to be aware of these issues as they can negatively impact the care being provided by the hospital, as well as the reputation of the provider.

One cause of these unnecessary visits are those deemed to be opioid-seeking visits. Opioid seeking can be operationalized as a pattern of behavior centering around the search and obtainment of opioids when they are not readily available (Fattore, Fadda, Antinori, & Fratta, 2014). Emergency medicine providers are visited by opioid-seeking individuals more often than other health care providers, and are also the leading prescriber of opioid medication (Smith et al., 2015). These visits from the opioid-using population have been described as being harder to treat, as the patients need more support from the provider, in a number of ways (Greenfield, Ownes, Lee, 2014). Total costs of medical visits were significantly higher for visits deemed to be opioid abuse or opioid-seeking related ($14,537) than matched controls ($8,663) (McAdam-Marx, Roland, Cleveland, & Oderda, 2010). Not only are these visits more expensive, but they are also occurring more often than in past.

Providers who work in emergency medicine have patients with pain issues stemming from a variety of etiologies. The initiation of pain treatment often begins without an established doctor-patient relationship, which is a benefit to successful pain interventions, and treatment overall (Wells, Pasero, & McCaffery, 2008). For example, when visiting an existing primary care provider, the physician will have records of past visits, as well as the results of past treatments and medications, whereas the emergency care physician may not know the patient's name when they initiate care. Because the primary care physician has a greater amount of information they are more likely to create an effective treatment plan while the emergency care physician may have to treat based on assumptions. Also, the emergency care setting can often consist of visits with inconsistent care as there could be patients with more pressing needs and concerns, or the provider may rush the patient out as they need the bed for another patient who is in a more critical condition (Hoppe, Houghland, Yaron, & Heard, 2013). This can lead to some ailments going untreated or under cared for. Patients and physicians may have different expectations for pain control. As mentioned, this may lead to a fracturing of the patient-provider relationship. Because opioids are an essential aspect of acute and chronic analgesia, physicians must balance the risk of possible misuse, abuse, and diversion, with the need for adequate pain relief (Hoppe, et al., 2013). Some studies have called for a more inhibited, or aggressive, approach to the prescription of opioid medication in the emergency department setting, and this seems to match the trend of opioid prescriptions (Wilson & Pendleton, 1989).

Opioid epidemic in the United States

While many of the negative aspects of the opioid epidemic are being seen in the

emergency department, the issue extends far past the walls of hospitals. In 2012, nearly 5 million individuals in the United States used prescription opioids in the prior month (Greenfield, et al., 2014). From 1995 through 2008 the number of opioid-seeking visits has increased by over 600 percent (Manchikanti, Fellows, Ailinani, & Pampati, 2010). In addition, the number of deaths resulting from an overdose of prescription opioid medication saw a near 400 percent increase (4,041 to 16,651) between the years of 1999 and 2010 (Jones, et al., 2010). In 2007, the number of deaths attributed to the use of opioids, about 35,000, surpassed the number of deaths stemming from motor vehicle accidents (Nolan & Amico, 2016). Today, the amount of drug overdose deaths attributed to opioids, nearly 19,000, has surpassed the number of heroin overdoses, 10,574 (Sherman, 2016). In the United States there is an estimated 120 drug overdose deaths every day, with the majority being attributed to the many forms of opioids (Rudd, Aleshire, Zibbell, & Gladden, 2016). While the epidemic has spread throughout the nation, in 2012 there were twelve states in the United States that had more opioid prescriptions than it did citizens (Nolan & Amico 2016). One of these states was New Mexico (Nolan & Amico 2016).

New Mexico, one of the states that leads the country in drug overdose deaths, saw 489 overdose deaths in 2012. Of these causalities, 49.3 percent of the deaths were attributed to opioid pain relievers (Levy et al., 2016). The number of overdoes increased to 547 in 2014, which is greater than the number of deaths resulting from firearm deaths, motor vehicle deaths, and falling deaths (Kaltenbach, 2016). The state of New Mexico has the highest drug overdose death rate for most of the past twenty years, and is typically twice the national average (Kaltenbach, 2016). The majority of these deaths are

opioid related, and the state is also experiencing a similar increase in the number of overdoses.

From 2000-2014, the number of opioid related deaths rose 95%, resulting in one death every day being attributed to an opioid-involved overdose (Kaltenbach, 2016). The majority of these deaths, 60%, involved prescription drugs, and no dual consumption with heroin. Particular areas in New Mexico, such as Taos County, Española, and the surrounding area of Northern New Mexico, have seen overdose rates that are more than 4.5 times the national average, as they see 67.7 overdose deaths per 100,000 people, compared to the national average of 14.7 per 100,000 (Centers for Disease Control and Prevention, n.d.).

This issue is not exclusive to adults, as minors are being exposed to the opioid epidemic as well. New Mexico youth report increased rates of non-medical prescription opioid use, compared to those over age of 25. The rate at which New Mexico high school students use opioids, and illegal drugs, is much higher than when compared to other students around the country (Centers for Disease Control and Prevention, n.d.). In addition, these minors have a higher usage rate of heroin, and contribute to heroin overdoses at a larger rate than other states (Greenfield, et al., 2014). This could signal a gateway effect, which would increase the need for stricter regulations. The increase in prescribing opioids has been constant across all ages, as the rate of young adults who have been prescribed opioids has rose from 4 to 10 percent between 1994 and 2007 (Fortuna, Robbins, Caiola, Joynt, & Halterman, 2010). Of New Mexicans who entered treatment programs in 2011, a third of these individuals were under the age of 25 (U.S. Department of Health and Human Services, 2012). This issue of opioid overdoses is not

particular to New Mexico.

The United States as a whole is seeing statistics related to opioid use and prescribing behaviors increase. From 1999 through 2014, there were a total of 165,000 deaths that were attributed to overdosing on prescription opioid medications in the United States (Houry & Baldwin, 2016). During the same time period, the amount of opioid medication that was prescribed quadrupled, while there was no increase in the amount of pain being reported (Manchikanti, et al., 2010; Houry & Baldwin, 2016). With the increase in the amount of opioid medication prescribed, it is also likely to assume the rate of opioid abuse, diversion, and overdoses would have a similar increase (Fishman, Papazian, Gonzalez, Riches, & Gilson, 2004). In fact, overdoses, and opioid abuse, have steadily been rising (Sullivan et al., 2008). While it appears the prescribing of opioids can lead to negative consequences, so too can the denial of prescription opioid medications.

Individuals who reported being denied opiates also reported higher levels of risk behaviors centered around opioids including daily use, engaging in illegal activities in order to obtain opioids, or the selling of opioids. These individuals also reported engaging in opioid misuse earlier in their lives than others (Fibbi, Silva, Johnson, Langer, & Lankenau, 2012). Those denied the desired medication also reported being prescribed opioids at a time prior to being denied. Reasons for a patient being denied opiates range from lack of insurance, access to the drug limited by an authority figure, and being identified as a drug abuser by the physician (Fibbi, et al., 2012). Individuals with a history of substance abuse or drug treatment, or those who reported injection drug use, were more likely to be denied prescriptions for their pain (Breitbart et al., 1997). Those with substance abuse histories were also doubted by physicians in regards to the veracity

of their reported pain levels (Fibbi, et al., 2012).

This lends credence to the theory of having a more aggressive approach to prescribing opioids, as individuals may be experiencing high levels of pain, and having a conservative approach to prescribing opioids may lead to the patient seek pain relief elsewhere. Untreated pain problems may lead to the misuse and abuse of illicit and prescription drugs (Novak, Herman-Stahl, Flannery, & Zimmerman, 2009). Upon being denied their opioid prescription, many patients sought pain relief elsewhere, either acquiring prescription opioids from another source, whether that be a friend, or a stranger (Fibbi et al., 2012). While less likely, these patients may seek out heroin as an alternative solution (Fibbi, et al., 2012).

While the number of visits, prescriptions, and adverse effects continue to rise, questions remain in regards to the efficacy of opioids being used to treat chronic pain (Trescot, et al., 2008; Cantrill et al., 2012). Studies have shown these medications can be effective in treating non-cancer chronic pain, but these studies are short-term and have no efficacy in determining if the same effectiveness is seen over longer periods of time (Trescot, et al., 2008). Also, there is little to no information on how these medications correlate with abuse or addiction, which is more likely for patients receiving opioids as a long-term solution (Cantrill et al., 2012). One study conducted by Shah, Hayes, and Martin, show certain characteristics of prescriptions have a greater chance of the patient being prescribed the medication becoming addicted (2017). The characteristics were observed on first time opioid patients, who were commercially insured, cancer-free, and opioid naive. The factors of the prescriptions included five and thirty days of opioid therapy, there being a second opioid prescription event, the cumulative dose being 700

morphine milligrams, and prescriptions with a ten and 30-day supply (Shah, et al., 2017). One out of every seven patients in actor pain treatment who were given a second prescription, or used a refill, remained on opioids for at least a year (Shah, et al., 2017).

These findings are supported by a study from Oregon in which the researchers found patients who received two prescription refills, or reached a cumulative dose between 400-799 morphine milligrams, were 2.3 and 3 times more likely to develop chronic opioid use behaviors, respectively (Deyo et al., 2016). This information is essential for administrators to be aware of as policies or guidelines could be formed to limit the amount of opioids or number of prescriptions the physicians write for patients. Thresholds, or benchmark indicators, can be useful for administrators in general in identifying issues or in creating organization-wide standards or expectations.

However, because opioids are proven to be effective in treating pain related to cancer and cancer treatments, and acute pain, there is support to allow opioids to be prescribed to all, with less regard to the possibility of addiction (Manchikanti, et al., 2010). This, in combination with advocacy groups pointing to the deleterious effects chronic pain can cause as a reason for the unlimited use of opioids, has led to opioids having a significant increase in availability and use of these medications (Noble et al., 2007). Furthermore, the increase in utilization has led to an increase in production, which has increased the price of opioid medication (Trescot, et al., 2008).

With this increase in all aspects of the opioid process, the Center for Disease Control (CDC) created a guideline for the prescribing of opioids with the intent of treating pain. The recommendations include which opioids to prescribe, as well as the duration the patients should be allowed to have these medications (Dowell, Haegerich, &

Chou, 2016). The reason for the guidelines is that the CDC has also determined the use of opioids in America has reached the level of being an epidemic (Sherman, 2016). This is backed by a sentiment from The New York Times which describes opioid addiction as "America's 50-state epidemic" as well as public health officials who call this epidemic the "worst drug crisis in American history" (Seelye, 2017). In addition to the CDC guidelines, the New Mexico Board of Pharmacy has also created initiatives and programs in an attempt to reduce the amount of opioids that are being prescribed, used, and diverted.

The state of New Mexico created the New Mexico Prescription Monitoring Program (NMPMP) which compiles prescription and dispensing information in regards to Schedule II-V controlled substances, which includes prescription opioid medication, but not heroin (New Mexico Board of Pharmacy Prescription Monitoring Program, n.d.). The CDC guidelines and the NMPMP can be beneficial to administrators who can influence the actions of the prescribing physicians. By following the guidelines and utilizing the NMPMP administrators can easily create new policies and regulations within their organizations without having to use significant resources in the research and design of the policies. However, this can also force administrators to create policies and initiatives they are not prepared to act on. Due to this, it is important for administrators in all industries to be aware of possible regulations or oversights that may be enacted or altered. By being proactive and implementing innovative and forward-thinking programs, these concerns can be avoided. This is especially true for venues that have the amount of regulation and importance, such as emergency departments.

With 42 percent of visits to emergency departments being attributed to pain, the ED

could be an efficient and effective venue for reducing and preventing the amount of opioid related overdoses, while also reducing the strain these visits create on the health care system (Cantrill et al., 2012; Noble et al., 2007).

Interventions

Drug monitoring programs have been identified as an essential and useful tool for providers to identify patients with a need for addiction services (Hildebran et al., 2014). These programs can also be effective in early identification of abuse and in the prevention of diversion (Hildebran et al., 2014). However, it has been shown the use of these programs in emergency departments are lower than in primary care, or other settings. It is also easier for primary care providers to utilize the PDMPs, as they are aware of who they be providing care for, and when, with some exceptions. With the majority of opioid related visits occurring in the emergency departments, it is important for the PDMPs to be readily accessible as these providers do not know who is coming through their doors, or when (Hildebran, et al., 2014). Also, emergency medicine providers have been shown to underestimate the amount of opioids they prescribe (Michael, Babu, Androski, & Reznek, 2016). By utilizing PDMPs, emergency care providers will be better able to decide whether there is an appropriate need for the prescription of opioid medications. Also, administrators will also be able to better track and observe the prescribing habits of their physicians.

In addition to being able to better recognize a patient who is not in need of an opioid prescription due to past behaviors, or current and recent prescriptions, PDMPs have direct benefits for providers who implement the system. These monitoring programs have been shown to decrease the amount of opioid prescriptions, overdose

hospitalizations related to opioid medications, visits attributed to opioid seeking, and prescription opioid deaths (John Hopkins Bloomberg School of Public Health, 2015). These are all outcomes administrators should be looking to eliminate and, through the use of PDMPs, administrators can quantifiably measure the difference the programs are making in their organizations. PDMPs can also be beneficial to organizations and administrators outside of hospitals and emergency departments. The accurate collection of prescriptions can create benefits and efficiencies for third-party healthcare payers and pharmacy benefit managers. These entities can use the given information to restrict high-risk individuals to receive care from only one doctor, which can benefit patient health and safety, while also reducing the number of unnecessary visits attributed to doctor shopping (John Hopkins Bloomberg School of Public Health, 2015). These programs can also provide an additional level of oversight from licensing boards, who can identify which clinicians, physicians, or facilities are prescribing at higher than average rate. Finally, public health agencies can use the data to identify high risk areas and populations, while law enforcement can use it to identify those who are high-risk or likely drug diverters (John Hopkins Bloomberg School of Public Health, 2015).

In 2005, the National All Schedules Prescription Electronic Reporting Act was established, in order for each state to support a controlled substance monitoring program. The objective of this Act is intended to give physicians a tool to aid in both prescribing controlled substances and identification of illicit fraud and abuse (Manchikanti, Whitfield, & Pallone, 2005). The goal of a PDMP is to provide a balanced approach to protect public safety and public health while supporting legitimate medical practice (Hoppe, et al., 2013). Also, the use of PDMPs should lead to a decrease in the amount of

inappropriate prescriptions, while providing adequate pain management with the use of appropriate prescriptions (Hoppe, et al., 2013). The appropriate use of these PDMPs should increase the level of care provided by the hospitals if implemented by administration. Considering an increased level of care is likely to improve the reputation of the hospital, these PDMPs should be implemented and utilized whenever possible. These programs have also proven to have an impact on the opioid epidemic in a positive manner (Hoppe, et al., 2013). However, as previously mentioned, because the PDMPs were used less in emergency care than other settings, and emergency care has the highest number of opioid seekers, it is unclear how effective this program was specifically in the emergency care setting.

The objective of the recidivism program was to determine if a novel, multi-departmental, coordinated intervention program focused on high-ED-utilizing, opioid-seeking patients could reduce the number of visits to the ED at 12 months (Ketcham, et al., 2014). In addition to this, I am evaluating how this program will have an impact on administrators and how they can mindfully create, develop, and initiate programs in order to have a significant impact, while also creating more efficient processes.

Other possible interventions include practices that attempt to stop the pain at the source, rehabilitation, or other methods rather than attempting to mask the pain. These methods can range from physical therapy, massage therapy, chiropractic realignment, and also acupuncture. Even though acupuncture is controversial in Western medicine, studies have shown it can be an effective treatment method.

Methods

In 2012, the prescription opioid recidivism program at the previously mentioned semi-rural, non-academic, community hospital was initiated. While not involved in the creation of the project, or in the initial data analysis, I have been brought on to examine the theory and practice of how administrators can implement interventions that have a positive impact on not only the operations of the organization, the employees of the organization, but also the customers of the organization. In this particular case, I will be examining how the implementation of a PDMP in the emergency department can reduce the impact of recidivism linked to patients with opioid abuse concerns.

This prescription opioid recidivism program hopes to identify individuals who place the greatest strain on the health care system, and also those who may be the most in need of an intervention program. The prescription opioid recidivism program was designed to be a quasi-experimental, open, prospective translational cohort study (Ketcham et al., 2014). The hospital and physician leading the program have selected a quasi-experiment for a number of reasons. First, it would be unethical to utilize a control group in this setting. The control group would either be made of individuals who were identified as at risk, and then received no assistance to combat their opioid-seeing behaviors. Also, if the hospital or physicians involved with the recidivism program were to randomly select individuals in the community, or those who visit the hospital, there would be no guarantee the population would be representative of the number of opioid-seeking individuals that exist in the community. While this design does decrease the external validity of the program, the design also allows for the population being studied to receive the greatest benefit. With the prescription opioid recidivism program

possessing a cohort element, I am hopeful I will able to easily identify factors that could lead to improved success in the recidivism program. For example, if cohorts that begin later in the study have more significant, and positive, behavior changes, it is reasonable to assume the providers have improved their process and skill in regards to this program. This was not a factor examined by the practitioners involved in the recidivism program.

The setting for the study was in a semi-rural, non-academic, community/county hospital. The emergency department at this hospital sees over 50,000 patients annually (Ketcham, et al., 2014). Subjects that made up the population study were both adults and adolescent patients who had been identified, with a high level of certainty, to use the emergency department at a high rate for opioid-seeking purposes. These individuals are a part of the population that has been identified as placing significant strain on the health care system, particularly in emergency departments similar to this one.

In this prescription opioid recidivism program, a high rate of emergency department utilization was defined as having greater than twelve visits in a year, or having six visits in the prior six months (Ketcham, et al., 2014). In addition to exceeding this visit threshold, patients that were referred by a friend or family member, or another health care professional, were considered for enrollment in the recidivism program. However, these individuals would be subject to the same vetting process as individuals identified through the examination of health records. Upon identification of a patient being at-risk, patients were systematically reviewed by an impartial, multi-disciplinary committee; known as the Opioid Recidivism Program Selection Committee. This method of selection differs from the selection process in previous studies.

A study conducted in Baltimore that did not use the snowball method, a technique

where interviewers ask their subjects for other individuals to interview, and instead used a criterion-based selection method. This study found no significant differences in the ages, genders, marital statuses, or years of education of patients who were identified as opioid seeking prescription (Gwin Mitchell et al., 2009). In other words, everyone who entered the program with the snowball method were similar. This could signal that the snowball method is not a valid method for addiction studies and may not provide a representative sample (Rounsaville & Kleber, 1985). By avoiding the pure snowball method, and using a targeted method, the recidivism program was, and will be, able to recruit patients who meet the criteria for opioid seeking, or opioid abuse, behavior but were not necessarily connected to other individuals identified as at risk. However, by still being open to recommendations from others, the recidivism program will benefit from being able to identify at-risk patients that may not be on the radar of this particular hospital, or the care providers of the hospital.

This use of targeted sampling could be subject to biases from the selection committee members who may be looking for characteristics that are not necessarily indicative of opioid abuse or opioid seeing behavior. However, the practitioners leading the recidivism program established guidelines, and a criterion for admittance, in an effort to remove any factors that could lead to admittance for those not truly qualified for treatment. More importantly, the selection process of the recidivism program utilizes methods that will remove factors that would prohibit or exclude patients in need of treatment. With the targeted method, and being open to recommendations, the recidivism program utilizes positive aspects of previous studies, but is not limited to a certain social network.

The selection committee was designed to be multi-departmental so every aspect of the patients' health records could be appropriately understood. This led to the committee being represented by individuals from departments such as the emergency department, nursing, pharmacy, and administration, as well as representatives from private practice offices associated with the hospital. The utilization of more than one trained and educated individual, in order to determine the validity of an opioid prescription, has been validated in previous studies (Hoppe, et al., 2013).

With members of the selection committee all coming from different areas of expertise, it was essential for these individuals to receive as much information about the patients who were identified as at-risk. Because of this, a greater amount of information than the individuals' medical charts at the local hospital, or hospitals, were considered. In addition to the patients' hospital records being reviewed, the selection committee also examined emergency department, laboratory, and state pharmacy board records. After a review of the information, the selection committee was to decide if the individual's behaviors were reflective of opioid abuse or opioid-seeking behaviors.

The selection committee had to be in consensus on any decision made about a patient's enrollment (Ketcham, et al., 2014). If classified by the committee to be a patient who represented opioid abuse or opioid seeking behaviors, patients were enrolled in the recidivism program. This program prohibited the prescription of opioids for these patients whether they were under hospital care, or leaving the premises. Patients were notified, by mail, that they had been enrolled in this opioid recidivism program. Patients also received information on the program upon their first visit to the hospital following admittance to the program. Also, all enrolled patients were identified as being in the recidivism

program through an icon on the electronic medical record (EMR) tracking board at the hospital. Due to the large number of patients identified as possible opioid abusing or opioid-seeking patients, the committee created a number of cohorts of patients who were enrolled in the program (Ketcham, et al., 2014).

Physician and nursing staff were trained and educated about the recidivism program at outset, and informed not to administer opioids to icon-bearing patients unless circumstances were extenuating. This recidivism program defined extenuating circumstances to be newly documented severe trauma. In addition, opioid prescriptions were not to be given to these individuals upon their release from care. The emergency department utilization rate for members enrolled in the recidivism program was continually updated via the ED electronic medical record dashboard. The primary outcome measure was the number of visits over 12 months pre- and post-intervention made by individuals placed in the recidivism program. Depending on when the patient was placed into the recidivism program, and when their cohort began, there could be 24-month post-intervention data for that particular patient.

In this study all visits to the emergency department were considered to be equal, and there was no coding or distinguishing between visit that were believed to be legitimate, and those attributed to opioid seeking behaviors. From March 2012 through February 2013, the Opioid Recidivism Program Selection Committee conducted a series of chart review sessions. In these sessions, patients who were identified as being at risk had their health records reviewed by the multi-disciplinary selection committee. The committee assessed the patients' validity for being admitted on the program. Replicated from the recidivism program, in total, the selection committee reviewed 542 patient

records. 298 of these were admitted into the recidivism program (N = 298 patients) (Ketcham, et al., 2014). These 298 patients were tracked for twelve month periods following the intervention and the number of visits made to the emergency department were recorded. From there, the head practitioner of the recidivism program created a spreadsheet with the count data of visits made in the 12-months post-intervention.

This is where I was brought onto the project. As part of my thesis, I utilized findings given to me from the practitioners leading the recidivism program, which primarily focused on cohort averages. This thesis project was submitted to the UNM Office of IRB, where it was categorized as non-human subjects research using secondary data (see Appendix). From there, I added additional analysis looking at individual results, aspects of the cohorts, and expanded the data to examine the cohorts that possessed 24 months' worth of data. I examined these results and compared to the number of emergency department visits that were made by the particular patient in the twelve-month period prior to the intervention. This led to the creation of two metrics, 12-month variance, and 24-month variance. To create this data, the number of visits prior to the intervention was subtracted from the number of visits following the intervention. This would result in a reduction of visits having a negative number, which would represent the number by which the patients decreased their visits.

Hypothesis: A PDMP will reduce the number of unnecessary visits to a hospital's emergency department.

Results

In a chart review session, the committee was able to determine the cost of an average emergency department visit by one of these patients determined to be at-risk. To find this number the committee took a random sample of 105 emergency department visits made by an individual within this population, and averaged the operating costs of those visits. It was found the average operating cost for one of these visits was $924 (Ketcham, et al., 2014).

Pre-Intervention

The earlier cohorts had higher visit rates than the later cohorts (Table 1a). The selection committee elected to forgo random selection of patients who were identified as at-risk. Instead, the committee elected to focus on the patients who were in the upper threshold of visits at the onset of the recidivism program. Because of this, each of the first four cohorts had an average visit rate that was equal to or greater than eighteen visits per patient (Table 1a). After these first initial cohorts, the remaining thirteen cohorts had visits rates that did not exceed fifteen visits per patient (Table 1a). The average cohort consisted of 17.5 patients, who had logged an average of 236.7 total emergency department visits in the twelve months prior to intervention (Table 1a). The size of the cohorts ranged from eight patients, to forty-one patients. The cohorts with the highest number of patients enrolled were the second cohort, which had thirty-eight, and the final cohort, which had the high of forty-one parents. This can be explained by the committee selecting the patients that had the highest amount of risk early in the program, and then attempting to enroll as many high-risk patients as possible at the end. On the other side, the final cohort had large numbers due to the committee wanting to enroll as many at-risk

patients as possible prior to the conclusion of the program.

As a whole, the 298 patients made a total number of 4,024 emergency department visits (Table 1a). The average number of visits in the twelve months prior to being enrolled in the recidivism program was 13.53, or more than one visit a month.

Post-intervention

There were only 10 patients, or 3 percent of the study, who visited the emergency department more often post-intervention than in the 12 months prior to being enrolled in the program (Table 3). Also, there were 5 patients, or 1.5 percent of the population, who had no difference in the number of visits 12 months pre and post-intervention (Table 3). This means with 4.5 percent of the population seeing no change or an increase in the number of emergency department visits, that the recidivism program saw a reduction in the number of emergency department visits in 95.5 percent of the population (Table 3).

The average number of visits for an individual patient in a twelve-month period was reduced from 13.5 visits, and a 3.68 standard deviation, to a mean of 4.5 visits a year, with a 1.3 standard deviation (Table 3). The study used Wilcoxon matched-pairs test and this resulted in a p-value of .001. The total number of visits to the emergency room made by these at-risk individuals also saw a large decrease. In the twelve-month period following being admitted to the program, the population had a 67% reduction in the number of emergency department visits (Table 1a). The post-intervention period saw a total of 1,319 visits, compared to 4,024 visits that took place in the period prior to the intervention, a decrease of 2,705 visits (Table 1a). With the elimination of these presumably unnecessary 2,705 visits, the health care provider saw great benefits. In addition to the lessened strain on their processes and employees, there was a significant

amount of financial resources that were saved as well. As found by the recidivism program data, an average cost of $924 for visits from patients in this population, it is estimated the provider was able to avoid $2.5 million in operating costs (Ketcham, et al., 2014). Also, there was approximately $8.38 million in charges that were avoided by eliminating the unnecessary opioid seeking visits from the emergency department (Ketcham, et al., 2014).

There was also information to be found within the cohorts. For example, the first four cohorts, on average, consisted of patients that had higher visit rates than the rest of the population enrolled in the recidivism program. However, when running a regression between the number of visits the cohorts averaged prior to the intervention, and the number of visits following the intervention, there was no correlation (r-square =.1178; p=.1775) (Figure 1). However, there was a closer relationship between the number of patients in a cohort and the number of visits for a cohort (Figure 2). This means the decision by the committee to take serious offenders in early cohorts, and as many patients as possible in later cohorts did not result in having a significant difference between patients. This could also occur due to the high variance found within each cohort, particularly for the cohorts that were smaller in size

Discussion

The proposed intervention and strategies of obtaining a population were possible due to the inherent characteristics of this community and the hospital under evaluation. For example, this hospital is the main health care provider for an area that covers hundreds of square miles. This allowed for a consolidation of records, resulting in a selection process with fewer obstacles. Also, this community possess a unique demographic and social profile that contributes to the results, while also being difficult to replicate.

The utilization of the multidisciplinary committee allowed for the proper identification and definition of the problem, while creating measures and procedures to measure and evaluate the recidivism program. Because there were no aspects of the actual healthcare being evaluated, this evaluation was more in line with traditional product evaluations, rather than one for a service, which the emergency department provides. However, the decision from the committee to select the patients identified to have the greatest risk of opioid abuse, and place them in the recidivism program first, created interesting results. For example, it was seen that there was no correlation between the cohort number and the number of visits each cohort averaged. This would suggest the committee's rough attempt to select the patients identified to have the greatest risk of opioid abuse could have been done with looking at the number of emergency room visits. Because of this, the practice of using emergency department visits as a key metric may not be as valid as the recidivism program assumed. The researcher would like to know what key metrics were discussed during the selection committee meetings, as they could provide essential information in the identification of at risk patients. Furthermore, with

542 patients being nominated for review, predominately as a result of emergency room visits, and only 298 patients in the study, a 55% rate, the validity of the measure is not clear. This does not dismiss the importance of using emergency room visits as a key indicator in future studies, or as a threshold measure for administrators, but suggests the possibility of underlying variables that may have a higher rate of prediction. Further studies may want to consider other metrics and determine their validity, in addition to examining the number of emergency department visits.

This decision also created difficulties in examining the results. Had the cohorts been created using a simple random sample, they could be compared as equals. This would allow for the analysis of success of the cohorts to be compared to each other in regards to when the cohort began. However, with the cohorts not being made equal, the researcher doesn't feel comfortable in comparing the success of the cohorts and extrapolating meaningful data. There are too many variables that come in to play when the cohorts are not randomized. For example, if the committee was correcting in assuming the patients chosen first for the program had a higher risk for abuse, it is likely they had a greater level of addiction than other study members. This could result in the patient engaging in more at-risk behaviors in order to obtain the drug, resting in a greater chance of death or arrest, which would eliminate the possibility for an emergency department visit.

Regardless of the committee's decision to place a triage or priority on the patients in the recidivism program with a greater identified risk of abuse, the patients and the program did yield notable results. With over 95% of the study seeing a decrease in the number of emergency departments in a twelve-month period, the success of this

recidivism program should be examined further. In just one year this study was able to reduce the strain on the emergency department and reduce the financial impact of unnecessary visits. While not specifically measured, given the literature, it is reasonable to assume the reduced strain, repeat visitors, unnecessary visits, and instances of doctor-shopping, resulted in an improved morale and attitude for the staff of the hospital under evaluation. The reduction of over 2,700 visits would also lead to improved efficiencies and improved patient satisfaction, as the providers would able to be more attentive to patients with more concerning needs.

However, there are factors that could influence the number of visits to the emergency department that the recidivism program, and this study, fail to account for. For example, one of the patients had 22 visits in the twelve-month period prior to intervention, and then recorded only two visits in the year post intervention. While this would appear to show positive evidence for the success and validity of a recidivism program, these numbers do not tell the whole story. As previously mentioned, the denial of a prescription opioid can, at times, lead to the patient engaging in high risk behaviors in order to obtain the drugs (Fibbi, et al., 2012). This could mean the particular patient with 22 visits, who knew she would not receive the drugs from the hospital, tries to rob a house so she can buy the drugs on the street. This leads to the patient being in jail for 10 of the 12 months they were in the recidivism program. While 2 visits over the twelve months sounds somewhat reasonable, 2 visits in 2 months would exceed the visit threshold that was the criteria for admittance to the program in the first place. Another confounding factor that was not addressed was the relocation of patietns to an area where their visits cannot be tracked by this particular hospital. Because of this, any further

research should have ways to investigate the behaviors and actions of the patients placed in the program, in order to ensure the validity of the program on the results.

Also, the recidivism program and PDMP established were concerned with patient outcomes and expectations, and the overall economic burden placed on the hospital. However, there are more entities represented in this study. While it is likely the patient experience will have a positive increase due to less inefficiencies in the system, there was no examination on the experience of the providers. Any similar studies should also examine the effect seen on the providers themselves, specifically in terms of task significance, job autonomy, and job satisfaction.

Conclusion

The use of prescription opioids has been increasing for a significant period of time. Also increasing at the same rates, and sometimes more rapidly, are the rates of use, abuse, and overdoses of these prescription medications. There have been a number of governmental regulations and warnings from industry leaders, but a reversal of the increasing numbers does not seem to be in sight. With this, hospitals and health organizations have created solutions to combat this opioid epidemic themselves. One of these solutions is the utilization of prescription drug monitoring programs. These can make the prescription habits of doctors, the consumption behaviors of patients, and the trends of a region, more readily available and easier to recognize for politicians, administrators, and the general public.

The implementation of a prescription drug monitoring program is recommended for hospitals, or providers, experiencing a burden related to the use and abuse of prescription opioid medications. However, additional factors should be examined, such as arrest record during time spent in program, self-report surveys on behavior and substance use, third-party reports, and blood or urine analysis. This recidivism program, and this study, have laid the groundwork to receiving the complete picture of how a recidivism program can create positive change, but the issue must be examined further.

While focused on a health issue, this study shows the importance of how a progressive administrator, or administration, can have a positive impact in various arenas. Even though it is not always the goal, politicians and government leaders can enact health policies and initiatives that have positive effects in other arenas as well. Conversely, programs or initiatives not focused on health care can positively impact the health sector.

This study showed how an initiative started by a physician and administrator resulted in the positive impact on the organization's finances, ability to serve customers (patients), while also having a positive impact on community health. By analyzing other areas of high concern, public administrators can preemptively stay ahead of regulations, create examples for other organizations to follow, and have positive outcomes in many areas of their organization.

Tables & Figures

Table 1a – Emergency Department Visitations by Cohorts

Table 1 sorts the cohorts by the date they began (Column 1), and lists the number of patients in each cohort (Column 2), the number of visits for all member of the cohort (Column 3), and the average number of visits per patient in each cohort (Column 4). Also displayed in Table 1a are the number of visits for all members of the cohort (Column 5) and the average number of visits per patient in each cohort, 12 months after being enrolled in the prescription opioid recidivism program. At the bottom of Figure 1 is the change seen in the number of visits, and in percentage of visits.

Cohort Date	Number of Patients	Baseline Visit Total	Baseline Avg Visit Rate per patient	Total Visits in 1st year	Visit Rate after 1 year
3/7/12	12	258	21.50	46	3.83***
5/1/12	38	684	18.00	176	4.63***
5/15/12	20	377	18.85	107	5.35***
5/22/12	18	343	19.06	121	6.72***
6/19/12	8	104	13.00	34	4.25***
7/2/12	11	107	10.91	37	3.36***
7/15/12	8	110	13.75	20	2.50***
7/23/12	15	222	14.80	80	5.33***
9/5/12	13	128	9.85	36	2.77***
9/14-22/12	10	116	11.60	55	5.50***
10/8/12	16	178	11.07	93	6.20***
11/2/12	14	155	11.08	62	4.62***
11/25-27/12	14	185	13.21	91	6.50***
12/12/12	22	274	12.45	104	4.73***
1/15/13	16	190	11.88	60	3.75***
2/5/13	22	216	9.82	77	3.59***
2/15/13	41	377	9.20	120	2.93***
Totals:	298	4024	13.53	1319	4.50
Change	n/a	n/a	n/a	-2,705	-9.03
% change	n/a	n/a	n/a	-67	-33.00

*** p-value <0.001

Table 1b

Similarly to Table 1a, Table 1b shows the number of patients in a cohort (Column 1),), the number of visits for all member of the cohort (Column 3), and the average number of visits per patient in each cohort (Column 4). Also displayed in Table 1b are the number of visits for all members of the cohort (Column 5) and the average number of visits per patient in each cohort, in the 12-24 months after being enrolled in the prescription opioid recidivism program. At the bottom of Table 1b is the change seen in the number of visits, and in percentage of visits.

	Number of Patients	Baseline Visit Total	Baseline Avg Visit Rate per patient	Total Visits in 2nd Year	Rate in 2nd year
Cohort 1	12	258	21.50	16	2.875
Cohort 2	38	684	18.00	140	3.68
Totals:	50	471	18.84	156	3.12
Change	n/a	n/a	n/a	-315	15.72
% Change	n/a	n/a	n/a	-33	-16.5

Table 2

Table 2 depicts the amount and percentage of patients enrolled in the prescription opioid recidivism program who saw a decrease in their number of visits in the 12 month period after enrollment (Column 2 and 3, respectively). Columns 4 and 5 have the amount and percentage of patients who saw no change in their number of visits, while Columns 6 and 7 show the same information but for patients who increased their number of visits to the emergency department after enrollment in the recidivism program.

	Decrease	Decrease %	No change	No change %	Increase	Increase %
Pre-intervention	n/a		n/a		n/a	
12 months	283	94.5	5	1.5	10	3
24 months	49	100	0	0	0	0

Table 3

This table shows the average amount of visits in the pre-intervention process, the standard deviation of these visits, and compares it to the results complied after all participants had completed 12 months in the recidivism program.

Time Period	**Average number of visits**	**Standard Deviation**	**P-value**
12 months pre-intervention	13.5	3.68	n/a
12 months post-intervention	4.5	1.3	n/a
Variance	-9	-2.38	n/a
Total	n/a	n/a	.001

Figure 1

This graph shows the relationship between the number of visits pre-intervention (x-axis) and post-intervention (y-axis).

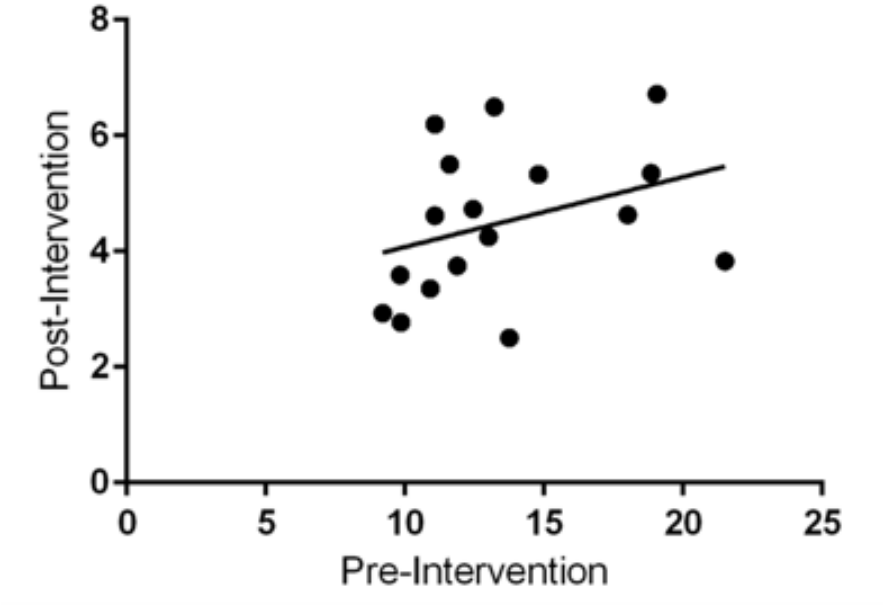
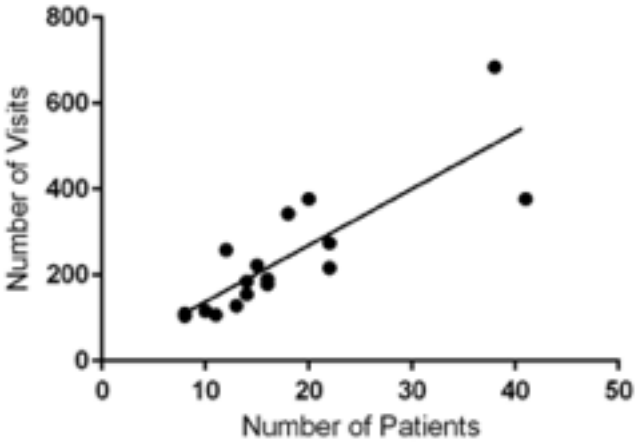


Figure 2

This graph shows the relationship between the number of patients in a given cohort (x-axis), and the total number of visits for that cohort (y-axis)



References

American Society of Interventional Pain Physicians. (n.d.). The American Society of Interventional Pain Physicians (ASIPP) Fact Sheet. Retrieved from https://www.asipp.org/documents/ASIPPFactSheet101111.pdf

Breitbart, W., Rosenfeld, B., Passik, S., Kaim, M., Funesti-Esch, J., & Stein, K. (1997). A comparison of pain report and adequacy of analgesic therapy in ambulatory AIDS patients with and without a history of substance abuse. *Pain*, *72*(1), 235-243. doi:10.1016/s0304-3959(97)00039-0

Brownstein, M. J. (1993). A brief history of opiates, opioid peptides, and opioid receptors. *Proceedings of the National Academy of Sciences*, *90*(12), 5391-5393. doi:10.1073/pnas.90.12.5391

Caldwell, N., Srebotnjak, T., Wang, T., & Hsia, R. (2013). "How much will I get charged for this?" Patient charges for top ten diagnoses in the emergency department. *PLoS ONE*, *8*(2), e55491. doi:10.1371/journal.pone.0055491

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*(4), 499-525. doi:10.1016/j.annemergmed.2012.06.013

Centers for Disease Control and Prevention (n.d.) Youth Risk Behavior Surveillance System. http://www.cdc.gov/healthyyouth/yrbs/index.htm

Center for Disease Control. (2017, February 22). Drug overdose mortality by state. Retrieved from https://www.cdc.gov/nchs/pressroom/sosmap/drug_poisoning_mortality/drug_poisoning.htm

Deblois, S., & Lepanto, L. (2016). Lean and Six Sigma in acute care: a systematic review of reviews. *International Journal of Health Care Quality Assurance*, *29*(2), 192-208. doi:10.1108/ijhcqa-05-2014-0058

De Koeijer, R., Paauwe, J., & Huijsman, R. (2014). Toward a conceptual framework for exploring multilevel relationships between Lean Management and Six Sigma, enabling HRM, strategic climate and outcomes in healthcare. *The International Journal of Human Resource Management*, *25(*21), 2911-2925. doi:10.1080/09585192.2014.953974

De Menezes, L. M., Wood, S., & Gelade, G. (2010). The integration of human resource and operation management practices and its link with performance: A longitudinal latent class study. *Journal of Operations Management*, *28*, 455–471.

Deyo, R. A., Hallvik, S. E., Hildebran, C., Marino, M., Dexter, E., Irvine, J. M., … Millet, L. M. (2016). Association between initial opioid prescribing patterns and subsequent long-

term use among opioid-naïve patients: A statewide retrospective cohort study. *Journal of General Internal Medicine*, *32*(1), 21-27. doi:10.1007/s11606-016-3810-3

Dowell, D., Haegerich, T. M., & Chou, R. (2016). CDC guideline for prescribing opioids for chronic pain—United States, 2016. *JAMA*, *315*(15), 1624. doi:10.1001/jama.2016.1464

Drug Free World. (n.d.). History of painkillers - Morphine, codeine, opium & methadone. Retrieved from http://www.drugfreeworld.org/drugfacts/painkillers/a-short-history.html

Drug overdose death in New Mexico. (n.d.). New Mexico Epidemiology, 2017(3), 1-4. Retrieved from https://nmhealth.org/data/view/report/1994/

Fattore, L., Fadda, P., Antinori, S., & Fratta, W. (2014). Role of opioid receptors in the reinstatement of opioid-seekingbBehavior: An overview. *Methods in Molecular Biology*, *1230*, 281-293. doi:10.1007/978-1-4939-1708-2_24

Fishman, S. M., Papazian, J. S., Gonzalez, S., Riches, P. S., & Gilson, A. (2004). Regulating opioid prescribing through prescription monitoring programs: balancing drug diversion and treatment of pain. *Pain Medicine, 5*(3), 309-324. doi:10.1111/j.1526-4637.2004.04049.x

Fortuna, R. J., Robbins, B. W., Caiola, E., Joynt, M., & Halterman, J. S. (2010). Prescribing of controlled medications to adolescents and young adults in the united states. *Pediatrics, 126*(6), 1108-1116. doi:10.1542/peds.2010-0791

Greenfield, B. L., Owens, M. D., & Ley, D. (2014). Opioid use in Albuquerque, New Mexico: a needs assessment of recent changes and treatment availability. *Addiction Science & Clinical Practice, 9*(1), 10. doi:10.1186/1940-0640-9-10

Gwin Mitchell, S., Kelly, S. M., Brown, B. S., Schacht Reisinger, H., Peterson, J. A., Ruhf, A., … Schwartz, R. P. (2009). Uses of diverted methadone and buprenorphine by opioid-addicted individuals in Baltimore, Maryland. *American Journal on Addictions, 18*(5), 346-355. doi:10.3109/10550490903077820

Hall, A. J., Logan, J. E., Toblin, R. L., Kaplan, J. A., Kraner, J. C., Bixler, D., … Crosby, A. E. (2008). Patterns of abuse among unintentional pharmaceutical overdose fatalities. *JAMA*, *300*(22), 2613. doi:10.1001/jama.2008.802

Harrison, A. P., Hansen, S. H., & Bartels, E. M. (2012). Transdermal opioid patches for pain treatment in Ancient Greece. *Pain Practice, 12*(8), 620-625. doi:10.1111/j.1533-2500.2012.00546.x

Hildebran, C., Cohen, D. J., Irvine, J. M., Foley, C., O'Kane, N., Beran, T., & Deyo, R. A. (2014). How clinicians use prescription drug monitoring programs: A qualitative inquiry. *Pain Medicine, 15*(7), 1179-1186. doi:10.1111/pme.12469

Holden, R. J. (2011). Lean thinking in emergency departments: A critical review. *Annals of Emergency Medicine, 57*, 265–278

Hoppe, J., Houghland, J., Yaron, M., & Heard, K. (2013). Prescription history of emergency department patients prescribed opioids. *Western Journal of Emergency Medicine, 14*(3), 247-252. doi:10.5811/westjem.2012.2.6915

Houry, D., & Baldwin, G. (2016). Announcing the CDC guideline for prescribing opioids for chronic pain. *Journal of Safety Research, 57*, 83-84. doi:10.1016/j.jsr.2016.03.007

John Hopkins Bloomberg School of Public Health. (2015). The prescription opioid epidemic: An evidence-based approach. Retrieved from http://www.jhsph.edu/research/centers-and-institutes/center-for-drug-safety-and-effectiveness/opioid-epidemic-town-hall-2015/2015-prescription-opioid-epidemic-report.pdf

Johnson, E. M., Porucznik, C. A., Anderson, J. W., & Rolfs, R. T. (2011). State-level strategies for reducing Prescription drug overdose deaths: Utah's prescription safety program. *Pain Medicine, 12*(suppl 2), S66-S72. doi:10.1111/j.1526-4637.2011.01126.x

Jones, C. M., Mack, K. A., & Paulozzi, L. J. (2013). Pharmaceutical overdose deaths, United States, 2010. *JAMA, 309*(7), 657. doi:10.1001/jama.2013.272

Kaltenbach, E. (2016). New Mexico's drug overdose death epidemic: Understanding the problem and finding a way out of the crisis. Retrieved from http://www.drugpolicy.org/sites/default/files/NM_OverdoseBrief_053116.pdf

Ketcham, E. M., Fredella, A., Malone, M., Ketcham, C., & Larkin, G. L. (2014). 279 A Novel Six-Sigma-Based Multidisciplinary Administrative Intervention Reduces Opioid-Seeking Patient Emergency Department Recidivism. *Annals of Emergency Medicine, 64*(4), S99.

Levy, B., Spelke, B., Paulozzi, L. J., Bell, J. M., Nolte, K. B., Lathrop, S., … Landen, M. (2016). Recognition and response to opioid overdose deaths—New Mexico, 2012. *Drug and Alcohol Dependence, 167*, 29-35. doi:10.1016/j.drugalcdep.2016.07.011

Manchikanti, L., Fellows, B., Ailinani, H., & Pampati, V. (2010). Therapeutic use, abuse, and nonmedical use of opioids: a ten-year perspective. *Pain Physician, 13*(5), 401-435. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/20859312

Manchikanti, L., Whitfield, E., & Pallone, F. (2005). Evolution of the National All Schedules Prescription Electronic Reporting Act (NASPER): a public law for balancing treatment of pain and drug abuse and diversion. *Pain Physician*, (8), 335-347.

McAdam-Marx, C., Roland, C. L., Cleveland, J., & Oderda, G. M. (2010). Costs of opioid abuse and misuse determined from a medicaid database. *Journal of Pain & Palliative Care Pharmacotherapy, 24*(1), 5-18. doi:10.3109/15360280903544877

Michael, S., Babu, K., Androski, C., & Reznek, M. (2016). A randomized trial of an

intervention to influence emergency medicine providers' opioid prescribing. *Annals of Emergency Medicine, 68*(4), S143. doi:10.1016/j.annemergmed.2016.08.390

New Mexico Board of Pharmacy Prescription Monitoring Program. (n.d.). The New Mexico Prescription Monitoring Program. Retrieved from http://www.nmpmp.org/Default.aspx

Noble, M., Treadwell, J. R., Tregear, S. J., Coates, V. H., Wiffen, P. J., Akafomo, C., & Schoelles, K. M. (2007). Long-term opioid management for chronic noncancer pain. *Cochrane Database of Systematic Reviews*. doi:10.1002/14651858.cd006605

Nolan, D., & Amico, C. (2016, February 23). How bad is the opioid epidemic? Retrieved from http://www.pbs.org/wgbh/frontline/article/how-bad-is-the-opioid-epidemic/

Norton, J., De Roquefeuil, G., David, M., Boulenger, J., Ritchie, K., & Mann, A. (2011). The mental health of doctor-shoppers: Experience from a patient-led fee-for-service primary care setting. *Journal of Affective Disorders, 131*(1-3), 428-432. doi:10.1016/j.jad.2010.12.009

Novak, S. P., Herman-Stahl, M., Flannery, B., & Zimmerman, M. (2009). Physical pain, common psychiatric and substance use disorders, and the non-medical use of prescription analgesics in the United States. *Drug and Alcohol Dependence, 100*(1-2), 63-70. doi:10.1016/j.drugalcdep.2008.09.013

Pisani, J. (2006, November 29). The Making of a LEGO. Retrieved December 6, 2014, from *Bloomberg Businessweek*: http://www.businessweek.com/stories/2006-11-29/the-making-of-a-legobusinessweek-business-news-stock-market-and-financial-advice

Poksinska, B. (2010), The current state of lean implementation in health care: literature review. *Quality Management in Health Care, 19* (4), pp. 319-329.

Pradel, V., Frauger, E., Thirion, X., Ronfle, E., Lapierre, V., Masut, A., … Micallef, J. (2009). Impact of a prescription monitoring program on doctor-shopping for high dosage buprenorphine. *Pharmacoepidemiology and Drug Safety, 18*(1), 36-43. doi:10.1002/pds.1681

Public Broadcasting Service. (1998). Opium throughout history. Retrieved from http://www.pbs.org/wgbh/pages/frontline/shows/heroin/etc/history.html

Robbins, J. , Garman, A.N. , Song, P.H. and McAlearney, A.S. (2012), How high-performance work systems drive health care value: an examination of leading process improvement strategies. *Quality Management in Health Care, 21*(3), pp. 188-202

Rounsaville, B. J., & Kleber, H. D. (1985). Psychotherapy/Counseling for opiate addicts: Strategies for use in different treatment settings. *International Journal of the Addictions, 20*(6-7), 869-896. doi:10.3109/10826088509047757

Rudd, R., Aleshire, N., Zibbell, J., & Gladden, R.M. (2016, 1 January). Increases in Drug and

Opioid Overdose Deaths – United States, 2000-2014. *Centers for Disease Control and Prevention.*

Saloner, B., Polsky, D., Kenney, G. M., Hempstead, K., & Rhodes, K. V. (2015). Most uninsured adults could schedule primary care appointments before the ACA, But average price was $160. *Health Affairs, 34*(5), 773-780. doi:10.1377/hlthaff.2014.1258)

Sansone, R. A., & Sansone, L. A. (2012). Doctor Shopping: A Phenomenon of Many Themes. *Innovations in Clinical Neuroscience, 9*(11-12), 42–46.

Seelye, J. (2017, January 6). Inside a killer drug epidemic: A look at America's opioid crisis. *The New York Times*. Retrieved from https://www.nytimes.com/2017/01/06/us/opioid-crisis-epidemic.html?_r=0

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. *Morbidity and Mortality Weekly Report, 66*(10), 265-269. doi:10.15585/mmwr.mm6610a1

Sherman, D. (2016). Opioid overdoses in Taos, New Mexico. *Journal of Global Health.* Retrieved from http://www.ghjournal.org/opioid-overdose-in-taos-new-mexico/

Smith, R. J., Kilaru, A. S., Perrone, J., Paciotti, B., Barg, F. K., Gadsden, S. M., & Meisel, Z. F. (2015). How, why, and for whom do emergency medicine providers use prescription drug monitoring programs? *Pain Medicine, 16*(6), 1122-1131. doi:10.1111/pme.12700

Sullivan, M. D., Edlund, M. J., Fan, M., DeVries, A., Braden, J. B., & Martin, B. C. (2008). Trends in use of opioids for non-cancer pain conditions 2000–2005 in Commercial and Medicaid insurance plans: The TROUP study. *Pain, 138*(2), 440-449. doi:10.1016/j.pain.2008.04.027

Trescot, A. M., Helm, S., Hansen, H., Benyamin, R., Glaser, S. E., Adlaka, R., ... Lee, M. (2008). Opioids in the management of chronic non-cancer pain: An update of American Society of the Interventional Pain Physicians' (ASIPP) guidelines. *Pain Physician, 11*(SPEC. ISS. 2).

United States Department of Health and Human Services. (2012, June). Treatment episode data set (TEDS) 2000 - 2010 National admissions to substance abuse treatment services. Retrieved from http://archive.samhsa.gov/data/2k12/TEDS2010N/TEDS2010NWeb.pdf

Uscher-Pines, L., Pines, J., Kellermann, A., Gillen, E., & Mehrotra, A. (2013). Deciding to Visit the Emergency Department for Non-Urgent Conditions: A Systematic Review of the Literature. *The American Journal of Managed Care, 19*(1), 47–59.

Wilson, J. E., & Pendleton, J. M. (1989). Oligoanalgesia in the emergency department. *The American Journal of Emergency Medicine, 7*(6), 620-623. doi:10.1016/0735-6757(89)90286-6

Appendix

UNM | Office of the Institutional Review Board

DATE:	April 25, 2017
REFERENCE #:	09317
PROJECT ID & TITLE:	[1058046-1] Reducing Opioid Seeking Recidivsm in Emergency Departments with the Implementation of a Prescription Drug Monitoring Program
PI OF RECORD:	Kate Cartwright, PhD
SUBMISSION TYPE:	New Project
BOARD DECISION:	DETERMINATION THAT IRB APPROVAL IS NOT REQUIRED
EFFECTIVE DATE:	April 25, 2017
DOCUMENTS:	• Application Form - IRB Project Information (UPDATED: 04/23/2017) • CV/Resume - K Cartwright CV 2017 (UPDATED: 04/23/2017) • Hospital Letter of Support (UPDATED: 04/23/2017) • Department Review (UPDATED: 04/23/2017) • IRB Project Team (UPDATED: 04/23/2017) • IRB Protocol (UPDATED: 04/23/2017) • Cartwright CITI 2 of 2 (UPDATED: 04/23/2017) • Cartwright CITI 1 of 2 (UPDATED: 04/23/2017) • Childs CITI 1 of 2 (UPDATED: 04/23/2017) • Childs CITI 2 of 2 (UPDATED: 04/23/2017)

Thank you for your New Project submission. The UNM IRB has determined that this project does not meet the definition of human subjects research according to federal regulations. IRB approval is not required.

This determination applies only to the activities described in the submission and does not apply should any changes be made to this research. A change in the research may disqualify this research from the current determination. If changes are being considered, it is the responsibility of the Principal Investigator to submit a new project for IRB review.

The Office of the IRB can be contacted through: mail at MSC02 1665, 1 University of New Mexico, Albuquerque, NM 87131-0001; phone at 505.277.2644; email at irbmaincampus@unm.edu; or in-person at 1805 Sigma Chi Rd. NE, Albuquerque, NM 87106. You can also visit the OIRB website at irb.unm.edu.