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Abstract

Background

Over the past 25 years, the United States has experienced an opioid epidemic that has cost hundreds of thousands of lives and which now constitutes as the worst drug overdose epidemic in U.S. history. Increases in opioid use and abuse have been found among men and women, most age groups, and all income levels (CDC, 2017). Methadone Maintenance Treatment (MMT) is one the most effective forms of treatment for opioid addiction, and has been found to reduce substance use, the risk of HIV, overdose, and criminal behaviors (Joseph et al., 2000; Mattick, Breen, Kimber, & Davoli, 2009). Both clinical experience and research show that MMT programs suffer from low retention and patient engagement in treatment and that patients are particularly vulnerable to disengagement or withdrawal during the early stages of treatment (Baxter et al., 2013). To address this problem, Thomas Jefferson University Hospital Narcotic Addiction Rehabilitation Program (TJUH NARP) utilized funds from Governor Wolf's administration to implement a program entitled the Center of Excellence (COE) to provide patients with increased support during the early stages of treatment. This support occurred in the form of one-on-one support from a Certified Recovery Specialist (CRS) who provided counselling, case management, and care coordination. As MMT treatment providers develop new programs such as the COE to address the problem of patient engagement and retention, it is critical that researchers assess their efficacy. In light of this, this dissertation has two specific aims. First, to examine the efficacy of COE program in improving patient retention, engagement in treatment, and opioid use. Second, to identify predictors of outcome within and across the conditions.

Methods

A case comparison study was conducted in which a control (N=57) and a treatment group (N=57) were compared regarding patient attendance, engagement, and opioid use. The control group consisted of a group admitted a year prior to the implementation of the COE while the treatment group received the supportive services of the COE. Data was collected from clinical documentation in the TJUH database. A convenience sample was used that consisted of all patients admitted during a specific time frame and who met criteria. Patient outcomes were analyzed through T-tests and chi-squared tests.

Findings

Patients within the treatment group had lower opioid use in months 1-3 (P=.02). This group also experienced lower attendance during month 1 (P=.04), month 2 (P=.05), month 3 (P=.02), and month 4 (P=.03). No other significant differences were found between groups regarding patient retention, engagement, or opioid use. However, while not significant, the treatment group had trends towards higher average medication doses (P=.13) and IOP attendance (P=.12). When outcomes were analyzed across conditions, patient admitted via transfer were found to have higher methadone doses on average when compared to patients admitted via self-referral (P=.01).

Discussion

The finding of reduced opioid use among the treatment group in months 1-3, as well as trends towards higher dosing and treatment attendance, suggests that the COE met with success in improving patient outcomes. At

the same time, the lack of significant findings regarding patient attendance and engagement, as well as the treatment group's lower attendance during months 1-4, suggests that the COE program implemented at TJUH NARP may not be entirely successful in meeting its goals. The significance of referral method challenges the efficacy of self-referral routes of entry into outpatient MMT. While further research is needed, these findings suggest that patients may benefit from inpatient stabilization prior to admittance into outpatient MMT.

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**The Efficacy of Supportive Services in the Early Stages of Outpatient Methadone
Maintenance Treatment**

Zachary Holtzman-Conston

A DISSERTATION

In

Social Work

Presented to the Faculties of the University of Pennsylvania

In

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Doctor of Social Work

2019

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The Efficacy of Supportive Services in the Early Stages of
Outpatient Methadone Maintenance Treatment

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Dedication

This dissertation is dedicated to the clients who I had the honor to work with in my first social work job at Thomas Jefferson University Hospital's Narcotic Addiction Rehabilitation Program. The determination, grit, and tenacity that they brought to their fight against addiction is inspirational and continues to motivate me to do this work. I am deeply grateful for having the chance to be a part of their lives.

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I would like to first thank Dr. Ram Cnaan for his steadfast support throughout the writing process. His thoughtful and calming approach to doctoral guidance moved this dissertation forward and helped me to gain the confidence to tackle this project. I would also like to thank Dr. Robert Sterling for helping to lead me throughout the research process and for his guidance both as a program director and as a dissertation committee member. To all the NARP staff, your support and partnership in this endeavor made this paper possible. Thank you to the teachers I have had the honor to learn from at SP2, for your guidance and inspiration throughout the years.

To my family, for reminding me of my potential and helping me to remain committed to this work during the most challenging periods. Thank you for reminding me of the power of helping others and to never stop pursuing social justice. Thank you to my classmates, whose friendship and comradery made this possible. Lastly, to Sammi, your belief in me and unwavering support helped carry me throughout this project.

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Chapter 1

Introduction and Statement of Purpose

We are now in the midst of an opioid epidemic. Drug overdose has become the leading cause of death in the United States and the majority of these deaths involve the use of an opioid. On average, 130 Americans die every day from drug overdose (Centers for Disease Control and Prevention, 2017). Between 1999-2017, over 700,000 people lost their lives to overdose (CDC, 2017). This problem has emerged as a result of the confluence of multiple historical events. An assumption within the medical community that opioids were safe, accompanied by a heightened emphasis on the treatment of pain, resulted in a liberalization of prescription law and increased opioid prescription practices (Manchikanti, et al. 2012). A hike in the presence of potent substances such as heroin and fentanyl resulted in a reduction of their costs and a dramatic increase in their lethality (Rudd, Seth, David, Scholl, 2016). Shifts in the economy and the structure of welfare, accompanied by a dissolution of many community supports, led to economic depression for many communities and an overreliance on opioids for relief (Dasgupta, Beletsky, & Ciccarone, 2018). The criminalization of opioid use resulted in a cycle of illegal behavior and the development of a “black market” in which marginalized groups became unable to enter legitimate forms of work (Chin, 2002).

This dissertation developed as a result of this author witnessing the effects of these historical processes as they played out in the lives of the patients at Thomas Jefferson University Hospital Narcotics Addiction Rehabilitation Program (TJUH NARP) a methadone maintenance treatment (MMT) program in Philadelphia. As a social worker, I saw the complex manner in which opioid addiction manifest both within individuals and the systems that maintain them. I also saw the extreme difficulty of treating opioid addiction, the frustratingly limited progress that

some patients made, and the frequency with which patients became disengaged or withdrew from treatment altogether.

In 2016, Governor Wolf launched the Centers of Excellence (COE), an initiative aimed at curtailing the effects of the opioid epidemic through increased systems coordination between medical and behavioral healthcare. Forty-five organizations were identified as COE and provided funding to develop programs to engage and treat individuals struggling with addiction. TJUH NARP, one of the first programs to receive the funding, utilized the grant to develop a team of certified recovery specialists (CRS), masters-level clinicians who would provide all new MMT patient with 30 days of supportive care. The care involved intensive support around issues of treatment initiation and methadone stabilization, including case management services, supportive counselling, and coordination with external supports. This was developed in response to issues of low treatment retention and engagement within MMT. In addition, these issues are particularly salient during the early stages of treatment in which patients are undergoing methadone stabilization and are at risk for early discontinuation.

In discussions with the program director, I was informed that there was a need for greater knowledge regarding the impact of the COE on patient performance. In response to this need, the first aim of this dissertation is to evaluate the efficacy of the COE as implemented at TJUH NARP. This paper asks the question: Is the COE efficacious in its ability to improve patient outcomes regarding engagement, retention, and opioid use? It intends to provide knowledge on the specific areas impacted by the introduction of the COE and to evaluate its overall impact on patient performance during the first nine months of treatment. The second aim is to identify predictors of outcome across condition. This endeavor is exploratory in design and intends to increase our insight into areas that may merit further investigation as potential

mediators of patient progress. Through both the first and second aim, this paper intends to provide knowledge for developers and implementers of MMT to better support and engage patients.

The paper is organized into six chapters. Chapter one provides an outline of the paper and an overview of the dissertation goals, setting, and key findings. Chapter two will provide a discussion of the opioid epidemic that has occurred in the United States over the past 25 years, its societal costs, and the most prominent causal explanations. It will provide a brief review of the history of opioid use, including a discussion of the evolution of opioids use as medicinal and recreational drug, as well as the historical circumstances under which the criminalization of opioid use occurred. It will conclude with a discussion of the development of MMT as it developed into one of the most effective means of treating opioid addiction.

Chapter three will discuss the challenges that MMT programs face in implementing effective treatment, including inadequate dosing policies, stigma associated with methadone, and the overregulation of MMT. It will describe the problem of patient retention and engagement in MMT and the uneven and low rates of retention among treatment providers. It will explain the structure of the Center of Excellence as implemented by TJUH NARP to address this problem as well as the theoretical underpinnings of its design. It will apply the concept of the therapeutic alliance to the COE program to explain and highlight the important role of the CRS in forming a working relationship between the patients and the treatment system.

Chapter four will outline this study's methodology. The outcomes of two groups, a control (N=57) who received treatment as usual, and a treatment group (N=57) who were admitted through the COE, are compared. The sample consists of all patients who met criteria and were admitted to TJUH NARP for MMT during a certain period. Using data from the TJUH

clinical database, outcome measures include the number of hours patients attended intensive outpatient (IOP) therapy, the number of days they attended methadone dosing, the ratio of opioid positive to negative drug screens provided, and the amount of time for patients to become stabilized. These measures were all chosen as determinants of patient levels of engagement to treatment as well as their overall progress towards recovery. Patient outcomes were analyzed through T-tests and chi-squared tests.

Chapter five will describe the study findings. The only significant a-priori difference found between groups was the referral route, with the treatment group significantly more likely to enter through a program-referral than through self-referral. This was not surprising, as the systems coordination efforts of the COE likely resulted in greater patient transfers. Two significant differences were found between groups regarding the outcome measures. Patients in the treatment group had significantly lower opioid use during months 1-3 as well as lower attendance during months 1-4. The reduction in opioid use during the first three months of treatment suggests that the increased support provided by the COE may have a positive impact upon patient initiation into treatment. Further, positive trends were seen within the treatment group's attendance to group therapy and medication dosing. At the same time, the lack of additional effects found as a result of the COE speaks to the limitations of this type of program. Lastly, in pursuit of this dissertation's second aim, T-tests revealed that patients who entered treatment from a transfer referral method had a significantly higher dose on average. Higher doses, as will be discussed, reflect greater patient engagement and progress in treatment. This finding suggests that referral route may be a predictor of patient outcomes.

Chapter six will conclude with a discussion of the study findings. It will highlight the positive impact of the COE on patient opioid use and explore potential reasons for the lack of

effect found in opioid use during the later months. Potential explanations include the withdrawal of COE support after 30 days and the frequency of relapse during this stage of treatment. It will discuss the lack of significant findings regarding patient engagement and attendance and suggest that the COE may not be influencing outcomes to the extent that was expected. Possible explanations for this include a mismatch between program and patient goals, a lack of resources within the patient population such as stable housing, and structural issues within the treatment program. It may also be that the expectation of more long-term benefits as a result of short-term supports was overly optimistic given the nature of opioid addiction and recovery. This chapter will also describe the study's limitations and suggestions for further research. Limitations identified include the use of non-probably sampling, limited sample size, and the short duration of the project. The finding of the significance of referral method suggests a direction for future studies that pay greater attention to this variable, including larger scale and experimental studies to explore the impact of different referral routes. It is suggested that the complex and difficult nature of the stabilization phase of MMT may be best addressed through the support of inpatient care. If this is the case, this study challenges self-referral methods of MMT entry and suggests that an alternate treatment model may result in more positive outcomes.

Chapter 2

Background and Review of the Literature

The Opioid Epidemic

Opioid addiction in the United States has a tremendous impact on the lives of individuals, families, and communities. The misuse of opioids has become recognized as one of the greatest public health disasters within the United States over the past several decades. Multiple politicians, journalists and public thinkers have described the current impact of opioid abuse as constituting an unprecedented crisis. In 2016, President Obama commented on the deadliness of the opioid epidemic, remarking how opioid overdoses were killing more people than car accidents and comparing the importance of fighting the opioid epidemic to that of fighting the Islamic State. Obama stated that “it’s costing lives and it’s devastating communities” (as cited in Mason, 2016, para 3). An article on PBS Frontline describes the opioid crisis as the “worst drug crisis in U.S. history” with death rates that “now rival those of AIDs during the 1990’s” (Nolan & Amico, 2016, para 1). Or consider a jarring statement made from Anthony Mason on the CBS Evening News, stating that “by the time this broadcast is over, three people will be dead, victims of an opioid epidemic that’s taking 140 lives in America every day” (CBS News, 2017).

Indeed, data on opioid abuse appears to support these claims. The United States Centers for Disease Control and Prevention (CDC) identified the opioid epidemic as the worst drug overdose epidemic in U.S. history (CDC, 2017). The damage caused by opiate abuse is vast and complex, and has been associated with loss of life, overdose, incarceration, decreased employment, disruptions in family, increased criminal activity, increased risk of HIV, tetanus, pneumonia, Hepatitis C, and malnutrition, among a host of other issues (Goode, 2005; Volkow, 2018). Recent years have also shown a significant increase in overdose and overdose related deaths. The

CDC has found that drug overdose has become the leading cause of accidental death in the United States, with drug overdoses more than tripling since 1999 (CDC, 2017). Between 2000 and 2014, the drug overdose death rate grew from 6.2 per 100,000 persons in 2000 to 14.7 per 100,000 in 2014 (Rudd, Aleshire, Zibbell, & Gladden, 2016). An estimated 64,000 people died in 2016 from drug overdoses, more than guns and car accidents, and occurring at a faster pace than the HIV epidemic at its height (CDC, 2017).

While multiple illicit substances have been linked to drug overdose, the overall increase in drug overdoses has primarily been driven by opioid abuse. Among the 64,000 drug overdose deaths estimated in 2016, the greatest increase occurred among deaths related to fentanyl and other synthetic opioids, which were involved in 20,000 overdose deaths (Rudd, Seth, David, Scholl, 2016). Heroin overdose deaths have more than quadrupled since 2010 (Rudd et al., 2016) and underwent a 6.2-fold increase from 2002 to 2015 (Rudd et al., 2016). While overdoses are the most glaring example of the opioid epidemic, over two million people are estimated to currently live with problems with opioids (Center for Behavioral Health Statistics and Quality, 2016). The Substance Abuse and Mental Health Services Administration found that 97.5 million people in the United States reported having used prescription opioid pain relievers, 12.5 million reported misusing opioids, and 2.1 million people began misuse of opioids for the first time that year (Hughes, et al., 2016). Heroin use has expanded among both men and women, most age groups, and all income levels.

Due to the complexity of the issue, the financial cost of the opioid crisis is difficult to estimate accurately, however, estimates have increased in recent years. In 2001, estimates of the financial cost of opiate addiction approximated 21.9 billion dollars annually, including losses in productivity (\$11.5 billion), criminal activities (\$5.2 billion), medical care (\$5.0 billion), and

social welfare (\$0.1 billion) (Mark, Woody, Juday, & Kleber, 2001). In 2007, societal costs of prescription opioid abuse were estimated at 55.7 billion dollars, including work place costs (\$25.6 billion), health care costs (\$25.0 billion), and criminal justice costs (\$5.1 billion) (Birnbaum et al., 2011). Most recently, in 2017, The White House Council of Economic Advisers estimated the overall cost of the opiate epidemic in 2015 to be 504 billion dollars, roughly half a trillion dollars (as cited in CNBC News, 2017).

One important factor informing the current epidemic is the rise of opioid prescribing practices for the treatment of pain during the 1990's. Between 1999 and 2014, sales of prescription opioids in the United States nearly quadrupled, despite no indication of higher rates of pain (CDC, 2016). Prescriptions for Oxycodone, a semi-synthetic opioid and common painkiller, increased 380% from 1992 to 2002 (Blanco et al., 2007). In the 1980's, multiple studies were published in favor of the use of opioids for treatment of pain, for example, reporting that less than one percent of patients who received prescription opioids developed symptoms of addiction (Porter & Jick, 1980) or that maintaining patients on opioid analgesics was a "safe, salutary and more humane alternative to the options of surgery or no treatment in patients with intractable non-malignant and no history of drug abuse" (Portenoy & Foley, 1986, p. 171). During the 1990's, a movement within the medical community, driven by patient groups, the federal government, and academic journals, argued that doctors were not effectively treating pain and that the eradication of pain within medicine should be given greater priority. In 1996, James Campbell, a prominent neurosurgeon at Johns Hopkins, made a speech at the American Pain Society, in which he argued for pain to be treated as a fifth vital sign, stating that "Vital signs are taken seriously. If pain were assessed with the same zeal as other vital signs are, it would have a

much better chance of being treated properly” (as cited in Department of Veterans Affairs, 2000, p. 5).

During the 1990’s pharmaceutical companies also began to market their products for long term treatment of pain as well as to pour funding into the expansion of opioid prescription and medical access. Gounder (2013) wrote that they “promoted their prescription narcotics to doctors through ads in highly regarded publications, and through continuing-education courses for medical professionals. They also funded non-profits such as the American Academy of Pain Management and the American Pain Society” (para. 11). Doctors found themselves under increased pressure to eradicate patients’ experiences of pain; for example, in 2001, the Joint Commission issued pain management procedures, instructing hospitals to make the treatment of pain a priority and to develop guidelines on how to measure pain. All of this resulted in mass over-prescription practices during the 1990’s and early 2000’s, and as a result, many individuals began their opioid use with prescription pain killers, eventually turning to street heroin due to its lower cost and ease of access. Jones (2013) found that four in five new heroin users started out misusing prescription painkillers. A 2014 survey of individuals receiving treatment for opioid addiction found that 94% of respondents reported they initiated heroin use because prescription opioids were “far more expensive and harder to obtain” (Cicero, Ellis, Surratt, & Kurtz, 2014, p. 822).

However, while prescription opioids may be at the root of the opioid epidemic, deaths from their use have remained relatively stable since 2011 (CDC, 2017). Increased awareness of the harms of opioid prescribing appears to have improved prescribing practices, resulting in the implementation of dosing guidelines (Franklin et al., 2012) and increased oversight and regulation of pain clinics (Surratt et al., 2014), both of which have met with success in improving

prescription practices. Cicero and Ellis (2015) argued that prescription monitoring programs and increased physician education on the appropriate use of opioids have also improved dosing practices. These researchers found that the number of people initiating opioid use from prescription opioids rather than heroin decreased from over 90% in 2005 to 67% in 2015. Lastly, abuse-deterrent formulations of prescription opioids, changes made to opioid medications that make them more difficult to abuse, have had some success in curtailing abuse (Cicero & Ellis, 2015).

Despite this progress, deaths from heroin and fentanyl, continue to rise. Another critical factor underlying the current epidemic is the prevalence and low cost of highly potent opioids, most significantly, fentanyl. Fentanyl is a synthetic opioid which is often sold in place of, or in conjunction with, other illicit substances. Often, fentanyl is sold to individuals who believe they are buying heroin, Oxycontin, or cocaine, who are unaware of the potency or toxicity of the substance they have purchased, which many seek to avoid (Carroll, Marshall, Rich, & Green, 2017). Fentanyl is 100 times more powerful than morphine, from 30 to 50 times more powerful than heroin, and produces greater respiratory depression and risk of overdose (NIDA, 2016). In 2015, the Drug Enforcement Administration National Heroin Threat Assessment Summary released nationwide alerts reporting that fentanyl was a “significant threat to public health and safety” (as cited in Lucyk & Nelson, 2017, p. 91). Deaths involving fentanyl rose 540 percent from 2014 to 2016, and in multiple states have been identified as responsible for over half of fatal overdoses (Ahmad, Rossen, Spencer, Warner, & Sutton, 2017). Dowell, Noonan, and Houry (2017) wrote that while increased heroin use and risk taking likely contribute, “available data suggest contamination of the heroin supply with illicitly manufactured fentanyl as the overwhelming driver of the recent increases in opioid-related overdose deaths” (p. 2295).

Finally, structural issues impacting communities have resulted in economic depression, unemployment, and a lack of community supports. The current opioid epidemic has seen a change in demographics impacted by opioid use. People who began using heroin in the 1960s were predominantly young men (82.8%; mean age, 16.5 years) whose first opioid of abuse was heroin (80%). However, more recent users are older (mean age, 22.9 years) men and women living in less urban areas (75.2%) who were introduced to opioids through prescription drugs (75.0%) (Cicero et al., 2014). Despite these changes, misuse of opioids maintains a higher prevalence among low-income individuals, as well as those who are uninsured and unemployed (Han et al., 2017).

The History of Opioid Use in the United States

Opium, a word derived from the Greek word for “juice,” is a brownish residue that is derived from the desiccation of the opium poppy plant *Papaver Somniferum* (Hemmings & Egan, 2012). First evidence of its use dates to 3500 BCE in lower Mesopotamia. Tablets found at the Sumerian spiritual center at Nippur describe the collection and treatment of poppy seeds, which historians believe was for the preparation of opium. Sumerians referred to the poppy plant as *hul gil*, meaning “joy plant,” referring to the sensations it produced when eaten (Kritikos & Papadaki 1967, as cited in Newton 2017). Use of the plant and drug for medical, religious and recreational purposes can be found in the history of the majority of civilizations. Several derivative drugs have since been developed with similar chemical properties to opium (Newton, 2017).

Opiate is a term classically used in pharmacology to refer to *natural opiates*, alkaloids that are naturally derived from the opium poppy plant, such as morphine, codeine, papaverine and thebaine. *Semi-synthetic opiates* include drugs such as heroin and prescription painkillers

(including Vicodin, Percocet, and OxyContin) which are created through chemical manipulation of natural opiates and were first developed in the early 20th century (Pathan & Williams, 2012). Following the development of semisynthetic opiates, several *synthetic opioids* were developed. These substances contain no natural opium; however, they have similar chemical properties and work similarly upon opioid receptors in the nervous system. Examples of these include Methadone, Fentanyl, and Buprenorphine. The term *opioid* was originally used in pharmacology to describe only synthetic opiates; however, the term is currently used to describe all analogs of opium, including natural, synthetic, or semisynthetic (Hemmings & Egan, 2012). It is this definition that will be used for this dissertation.

Opioids have been in U.S. history since the earliest settlers arrived in the New World in the 1600's. Prior to the twentieth century, opium was one of the few treatments available for effectively treating pain. In early America, it was commonly administered as a medicinal remedy for many ailments including pain, diarrhea, and sleeplessness (Goode, 2005). Dary (2008) wrote that opium was "administered freely by physicians to relieve pain. Many colonists cultivated opium poppies in their gardens and used their resin in whiskey to relieve coughs, aches, and pains. Opium had been around for centuries. Physicians viewed it as a medicine and not a drug and there was no concept of any addiction from medicines" (p. 36). During the second half of the nineteenth century, opioid use expanded, primarily for its medical use (Strain & Stitzer, 2006). Over-the-counter medications containing opium, as well as cocaine and alcohol, were marketed as cure-alls for a variety of illnesses and conditions. For example, Mrs. Winslow's Soothing Syrup was a popular concoction consisting of morphine and alcohol that was marketed as a safe remedy for teething pain and numerous other ills experienced by infants (Woody Library-Museum of Anesthesiology, 2018, para. 1). Because manufacturers were not required to list

ingredients on their products, consumers were not aware that their products contained opioids (Goode, 2005).

Around the beginning of the 20th century, a series of historical occurrences changed the landscape of opioid use. First, many technological advances had occurred throughout the 19th century that allowed for the administration of stronger and more purer forms of opioids with a far greater risk for addiction. Prior to the nineteenth century, opioids were consumed in the milder and more natural form of opium; however, in 1803, morphine was first extracted, followed by codeine in 1831. The hypodermic syringe was also introduced in the United States in 1856, allowing for a more rapid delivery of opioid compounds into the bloodstream (Goode, 2005). In 1898 heroin was introduced to the public, initially marketed as a cough suppressant and non-addictive analgesic by Friedrich Bayer Company, which would soon become a popular drug particularly among inner-city men (Strain & Stitzer, 2006).

Second, perceptions regarding opioid use were changing, accompanied by a shift in user demographics. In the early 1800's, addiction generally occurred among middle and upper middle-class white women, however, with the introduction of heroin, opioid use began to be seen increasingly as an inner-city drug. In the 1850's Chinese migrants had arrived, many who worked on the railroad or in gold mines, and brought with them the practice of smoking opium, which had become popular in China after its introduction by the British. In San Francisco, for example, migrants established opium dens which began to be patronized by upper class whites, prompting racist and xenophobic fears regarding the Chinese, who were accused of using opium to seduce white women (Goode, 2005). This also resulted in the first anti-drug law in the United States, the Opium Den Ordinance, which made it a misdemeanor to keep or frequent opium dens

and which Gierenger (2013) wrote, was the “opening shot in a war [on drugs] that is still raging on” (para. 1).

The 20th century marked the end of a period of relative openness for opioid use and distribution and the beginning of the ‘war on drugs,’ a series of efforts by the U.S. government to criminalize and eradicate the production, consumption, and distribution of psychoactive drugs. In 1906 the Pure Food and Drug Act was passed, which required manufacturers to list the contents of medications that were shipped across state lines. The result was a withdrawal from the market of several medications as well as a heightened awareness of the contents of medications previously considered safe. The act resulted in both a reduction in sales of medications containing opioids as well the number of people dependent on opioids (Strain & Stitzer, 2006). This period also saw a heightened awareness of the harms of opioid use and its potential for dependency, as well as the beginnings of opioid maintenance treatment.

The Development of Methadone Maintenance Treatment

In the early 1900’s, medical treatment for opioid addiction generally consisted of providing medications to aid in the reduction of withdrawal symptoms and monitoring patients as they tapered from opioids. However, doctors became alarmed by high relapse rates and levels of abuse and began sustaining patients on opioids such as morphine or heroin through outpatient clinics. The Harrison Act was passed in 1914, which heavily taxed and regulated the manufacturing, distribution, and use of opioids and cocaine. The act resulted in the development of a registry of all individuals involved in these activities as well as increased arrests and incarcerations (Booth, 1996). By 1923, clinics sustaining patients on opioids had been shut down. Nevius (2016) wrote that while physicians were technically excluded if the drugs were

deemed medically necessary, the law severely limited the ability of doctors to prescribe opiates. The act “singled out addiction as a moral failing, not a medical disease, which made it nearly impossible for physicians to treat anyone with an opiate dependence. Drugs became a matter of law enforcement, not public health” (para 12.). In a climate shrouded in xenophobia and fears of the harms of illicit substance use, the clinics were stigmatized and perceived as abetting drug use. Federal agencies interpreted the Harrison Act as prohibiting the maintenance of individuals with active addiction, and subsequently threatened or prosecuted physicians doing so (Kleber, 2008). Kleber (2008) wrote that “Between 1919 and 1935, approximately 25,000 physicians were indicted under the Harrison Act and 10% were imprisoned. Despite 1921 and 1926 Supreme Court rulings that the act did not forbid such prescribing, most physicians avoided it, ending the role of the medical profession in treating patients with addiction for 4 decades” (para. 2).

The prescription of opioids as a treatment for opioid addiction was not brought back into practice until the 1960’s when Methadone Maintenance Treatment (MMT) was developed. Methadone is a synthetic opioid first developed in Germany in 1937 by two scientists, Gustav Ehrhart and Max Bockmuhl, who developed a new synthetic opioid in response to Germany’s opium shortage. It was first introduced into the United States by Eli Lilly and Company under the brand name Dolophine in 1947. Methadone was first tested as a treatment for opiate withdrawal in 1949, by Isbell and Vogel, who worked with the U.S. Public Health Hospital in Lexington, Kentucky. These researchers compared the use of morphine and methadone for medically supervised withdrawal from opioids. In this study, patients with opioid addictions were administered gradually decreasing doses to aid with withdrawal symptoms. The researchers wrote of methadone that “it is the most satisfactory method of withdrawal we have used” (Isbell

& Vogel, 1949, p. 912), writing that when utilizing methadone, “the abstinence syndrome which developed was slower in onset, milder, and perhaps more prolonged than abstinence from morphine” (Isbell & Vogel, 1949, p. 911). The authors warn that methadone has the potential to cultivate dependence, as well as to produce effects of euphoria when used in higher doses, and suggest providing dosages that are the minimum required for pain relief (Isbell & Vogel, 1949).

Following these early studies, MMT was first experimented with as a treatment for opioid addiction in New York City as a response to the increase in heroin use following World War II. Despite the efforts of the Federal Bureau of Narcotics in 1930, it became clear that the Federal Government’s punitive acts had been unsuccessful in curtailing the use of illicit opioids. From the 1950’s to 1960’s, heroin injection became the leading cause of death for young adults living in New York City, and people struggling with heroin addiction filled New York City’s jails and shelters (Joseph, Stancliff, & Langrod, 2000). Between 1950 and 1961, deaths from heroin increased from 7.2 per 10,000 deaths to 35.8 per 10,000 deaths (Halpern & Rho, 1966). In the late 1950’s, multiple requests were made for the development of greater treatment of heroin addiction, including reports from the Joint Committee Bar Association, the American Medical Association, and the Academy of Medicine.

The Health Research Council (HRC) of New York City funded the first research project and implementation of MMT conducted at The Rockefeller University in 1964 (Strain & Stitzer, 2006). Dole and Nyswander (1966) directed the study and were the first to utilize methadone as a sustaining medication, rather than as an aid in tapering. Their research began in 1964 with six male individuals, each with histories of addiction and involvement with the criminal justice system. Patients maintained on morphine experienced sedation and preoccupation with obtaining their next dosage. However, they found that when patients were prescribed daily doses of

methadone, at gradually increasing doses, and prescribed “in relation to the tolerance of the patient” (Dole, Nyswander & Kreek, 1966, p. 306), patients could obtain a “narcotic blockade,” meaning they no longer experienced the euphoric effects of heroin or other opioids. Most importantly, patients lost their craving for opioids and experienced their withdrawal symptoms being suppressed for 24 to 36 hours. Patients did not experience respiratory depression and side effects appeared to be minor. Additionally, patients did not experience sedation or lethargy and seemed less preoccupied with the use of drugs (Dole, Nyswander, & Kreek, 1966).

Dole, Nyswander and Kreek’s research expanded to include 114 patients sustained on methadone. These patients were initially stabilized on methadone through inpatient facilities before being transferred to an outpatient clinic. Patients were required to have histories of intravenous heroin use of at least 4 years, to have had prior treatment failure, to be at least age 19, to have a primary dependence on opiates, to have no history of psychosis or significant medical complications, as well as having voluntary admission to treatment. These patients, who had been through prior unsuccessful attempts at rehabilitation, showed promising results. Patients had high levels of retention, reduced criminal behavior, and improved social functioning. The researchers write that “Patients who had spent the preceding 5 to 15 years in jail or as addicts on the street are now steadily employed, well dressed, in good health, responsible for families, and saving money. Heroin use has been stopped, except for intermittent experiments made by some patients in the early stages of treatment” (Dole, Nyswander, & Kreek, 1966, p. 309). The researchers began conducting multiple double-blind studies, administering multiple forms of opioids to patients at different doses of methadone. The researchers determined 80-120 mg to be necessary for the obtainment of a blocking dose and concluded that methadone, when provided in therapeutic doses, “eliminates the euphoric appeal of heroin and the abstinence

symptoms”, and is “sufficiently free from toxic or dysphoric effects”, as well as “orally effective, long acting, medically safe, and compatible with normal performance in work and at school” (Dole, Nyswander, & Kreek, 1966, p. 309). By 1968, there would be over 44,000 patients in New York State and over 179,000 patients nationwide on MMT (Joseph et al., 2000).

In 1965, a committee was formed to evaluate New York City’s methadone programs and released a final report in 1974. By this time there were roughly 17,500 methadone patients within New York City, Nassau, Suffolk and Westchester counties of New York (Joseph et al., 2000). The evaluation found an overall retention rate of 77%, increased productivity (employment, education, etc.), as well as a reduction in arrest rates. The evaluators identified the most common reason for discharge to be alcohol or non-opioid drug use and that this occurred in roughly 25% of patients (alcoholism was seen to be most common with Black patients and non-opioid drug use was most common among White patients under 30). The evaluators found that a large percentage of patients entered treatment with life-threatening illness and highlighted the importance of affiliating methadone programs with medical hospitals. While the death rate of patients was slightly higher than the death rate of the New York City population, the death rate of patients who left treatment was more than three-times the rate of patients in treatment. 64% of deaths for patients who left treatment were drug related, whereas only 30% of deaths for patients in treatment appeared to be drug related (Gearing & Schweitzer, 1974).

Poor outcomes for patients who left treatment were noted within multiple research studies. In 1978, Dole and Joseph (1978) found that of 846 randomly selected patients who had been discharged from New York City methadone programs, only 8% appeared to have avoided illicit substance relapse and incarceration, with 64% who had relapsed on heroin and 22% using non-opioid illicit substances. The researchers found that duration of heroin addiction, length of

time in treatment, and type of termination (whether patient was in “good standing” or discharged with cause) were the most significant predictors of discharged patient outcomes. Gender, ethnicity, and level of education were not seen to be predictors of post-treatment heroin use; however, the presence of employment and social supports did appear to influence outcomes. Of patients who had left in good standing, 34% appeared abstinent from illicit substances and criminality, whereas only 3% discharged for cause had maintained abstinence. Patients with the most likelihood for positive outcomes were those who had experienced addiction for less than five years, remained in methadone maintenance treatment for three or more years, and left treatment in positive standing (Dole & Joseph, 1978).

While methadone is one of most researched forms of substance abuse treatment, relatively few randomized control trials (RCT) have been conducted on MMT (Mattick & Hall, 1998). Mattick and Hall (1998) suggested that when MMT was first developed, RCT’s were not commonly practiced, and that therefore, the chance to randomly assign patients to methadone and minimal treatment was rarely taken before methadone maintenance had become a widely available form of treatment, writing that “By the time methadone maintenance had become an important part of the publicly-funded treatment system for opioid dependence in the early 1970’s, it was difficult to deny the treatment to people who might have benefited from it” (p. 21). In 1969 the first RCT of MMT was conducted in New York by Dole and colleagues. Utilizing recently imprisoned participants with opioid addiction and at least four years of opioid use, the researchers compared heroin use and prison recidivism rates. Thirty-four men, who had become eligible for release from prison, were divided into two groups: sixteen received methadone maintenance while the other sixteen received no treatment and were assigned to a waiting list. At 12-months post release, of the participants assigned to methadone maintenance six had become

employed or enrolled in school, three experienced re-incarceration, and none had returned to daily heroin use (although ten had used since their release and three continued to use intermittently). Of the control group, all sixteen had been re-incarcerated and returned to using heroin daily (Dole et al., 1969).

From 1972 to 1975, Newman and Whitehill (1979) conducted an RCT comparing methadone maintenance and placebo among individuals with opioid addiction in Hong Kong. Participants were required to have at least a four-year history of addiction, one failed attempt at treatment, and drug screens evidencing daily opioid use. All participants were initially stabilized on 60 mg and received counselling and supportive services. One group was maintained on methadone and was able to determine their dosage in collaboration with the prescribing doctor (the average dose was 97 mg), while the control group had their dose tapered by 1 mg a day and subsequently were provided a placebo. After 32 weeks, 10% of the controls were still in treatment, compared with 76% of those receiving methadone. After tracking participants for three years, only one member of the original control group remained in treatment, compared to 28 of the methadone group (Newman & Whitehill, 1979).

Fueled by evidence of the effectiveness of MMT, the 1970's brought about an expansion of MMT programs in several cities throughout the United States. Federal, state, and local governments became involved in the newly expanded programs, and in 1972, the Food and Drug Administration developed regulations, stipulating the types of services MMT programs were to provide. Ball and Ross (2012) described how simultaneously, local jurisdictions established bureaucracies to administer, fund, and audit MMT facilities. The authors wrote that because of this expansion, methadone maintenance “changed from a medically supervised treatment for a designated population of heroin addicts to a more diversified form of treatment and rehabilitation

provided to unselected addict patients” (p. 16). Treatment modalities and policies differed regarding the number of patients treated, the qualifications of staff and direction, methadone doses prescribed, and the administration of drug testing (Ball & Ross, 2012).

The end of the 1970’s and into the 1980’s brought about a reduction in MMT expansion within the United States. For a ten-year period, no new treatment facilities were opened in New York City, and while other states saw minor expansions, the period was generally one of reduction in funding (Ball & Ross, 2012). Gerstein and Lewin (1990) suggest that the funding drought lasted from the mid-1970s into the mid-1980s and resulted from a shifting of public MMT into the hands of states. Although the programs that developed from the Dole-Nyswander model were already under-funded, the 1980s brought about even greater decline in support. As a result, “programs were forced to curtail treatment and rehabilitative services, staff turnover was high, and the quality of care declined. At the same time, many programs were beset with community opposition, lack of administrative support, and general public apathy or hostility” (Ball & Ross, 2012, p. 16-17).

Despite the reduction in funding, there was an expansion of MMT, as well as research within the United States and internationally, which continued to investigate methadone’s efficacy. In 1981, Gunne and Gronbladh (1981) evaluated the Swedish methadone maintenance program, conducting an RCT in which they compared MMT to a control group that received no-treatment. Participants were age twenty to twenty-four, and as in prior studies, had a minimum history of four years of opioid use, previous failed attempts at treatment, and daily opioid use. Seventeen patients within the treatment control group underwent a six-month in-patient vocational rehabilitation accompanied by methadone maintenance, whereas the nineteen within the control group received no treatment (this group was offered a drug-free treatment, however,

all of members declined treatment upon learning that methadone would not be provided). At the end of two years, researchers followed up with both groups to evaluate outcomes with both groups. The control group was traced through a variety of contacts including outpatient clinics, social workers, social security information or criminal registries, whereas participants on methadone were evaluated through personal interviews, drug urinalyses, and proof of employment. Again, participants receiving methadone had far greater outcomes. For the control subjects the “outcome was very poor”, (Gunne & Gronbladh, 1981, p. 254) with only one out of seventeen becoming drug-free, whereas within the experimental group, twelve were no longer utilizing opiates or other drugs. The researchers write that of the treatment group, “76 per cent had become rehabilitated,” whereas “the controls either died, acquired serious infectious diseases, or ended up in prison” (Gunne & Gronbladh, 1981, p. 254).

In the mid-1980’s, Ball and Ross (2012) conducted an evaluation of the outcomes of 617 male patients in methadone maintenance programs in New York City, Philadelphia, and Baltimore. The researchers examined the use of heroin, use of additional illicit substances, and criminality. The researchers argue that treatment policies, such as willingness to provide higher doses, directly impacted patient outcomes. The authors found that dosage of methadone was a critical factor in reducing heroin use, regardless of which program patients were enrolled in. The study found that 28% of patients receiving doses of less than 45 mg continued to use heroin, compared to 5.4% of those with doses 46mg or higher. Most significantly, they found no heroin use within the group of patients receiving dosages of 71 mg or more. They also found a correlation between time spent in treatment and engagement in criminal behavior, with patients who had been in treatment for at least six months seeing a 79% reduction in crime. Of the 105

patients who left methadone treatment, 82% relapsed on heroin within 12 months, and of the 23 who had left in good standing, 16 (69.5%) had relapsed (Ball & Ross, 2012).

Chapter 3

Problem Formulation

Issues with Methadone Maintenance Treatment

Since these early studies, a large body of research has identified MMT to be one of the most effective treatments for opiate use disorders (Joseph et al., 2000; Mattick, Breen, Kimber, & Davoli, 2009). MMT has been seen to reduce illicit substance use (Gossop, Marsden, Stewart, & Treacy, 2001), the risk of HIV (Ball, Lange, Myers, & Friedman, 1988; Novick et al. 1990; Marsch, 1998), criminality (Davstad, Stenbacka, Leifman, & Romelsjö, 2009; Marsch, 1998), and overdose (Caplehorn, Dalton, Haldar, Petrenas, & Nisbet, 1996). Despite its well documented efficacy, many individuals with opiate use disorders do not receive the therapeutic benefits of MMT.

One of the reasons for this is the lack of adequate MMT facilities to address the current crisis, with only about 10% of medical facilities providing some form of MMT (Creedon, Quinn, Liu, Hodgkin, & Horgan, 2015). Estimates of MMT utilization among individuals with opioid addiction have ranged from 14-19% (Consensus Conference, N.I.H., 1998), however, a more recent estimate does not appear to be available and there is a dearth of research on the subject. Deck and Carlson (2004) write that “With so much attention in prior research focused on demonstrating the efficacy of MMT for treating opiate dependence, very little, if any, research has been conducted on systemic factors that influence access to MMT” (p. 165). With a 900% increase in individuals seeking treatment for opioids from 1997 to 2011, the issue is as critical as ever (SAMHSA 2010).

There are several additional reasons why individuals with opioid addiction may not access MMT or why patients on MMT may not acquire therapeutic gains. First, despite time

spent in treatment, patients may not obtain a therapeutic dosage (TD) of methadone. When a patient has obtained a TD, they will see a reduction in withdrawal symptoms and cravings for opioids, as well as a blocking of the euphoric effects of opioid use. Research shows that dosage amounts differ from one patient to another. Opioid tolerance, which has been associated with amount and duration of opioid use (Stevens & Yaksh, 1989), genetic background (Kest, Hopkins, Palmese, Adler, & Mogil, 2002), biomedical conditions (Arner & Meyerson, 1988) and psychiatric conditions (Maremmani et al., 2000), has been identified as a central predictor of a patient's therapeutic dose. These factors have been seen to impact what determines a TD for each individual patient, and it has been recommended that MMT facilities remain open to a variety of dosing needs (Trafton, Minkel, & Humphreys, 2006). Further, Pedrero-Pérez and MethaQoL (2017) found that including patients in the process of determining a dosage correlated with levels of patient satisfaction with treatment. These researchers argue that the emphasis on increasing doses ignores factors such as quality of life, cognitive performance, and satisfaction with treatment, and that for some, lower doses may in fact be more efficacious.

However, the majority of research is clear: higher doses show results. In a seven-year follow-up study, McGlothlin and Anglin (1981) compared the patient outcomes of clinics providing higher doses with clinics providing lower doses. The researchers found that the patients attending the higher dose clinics had significantly fewer arrests, less incarceration, less narcotic addiction, and less self-reported criminal behavior. While data analysis illustrated that a significant degree of the positive results resulted from greater retention in treatment, it also showed that "the advantage persisted to the time of interview some six to seven years after admission and existed for periods without as well as with methadone" (p. 1062). In 1993, Strain, Stitzer, Liebson and Bigelow (1993) conducted a double-blind randomized control trial in which they compared the effects of three methadone dosages (0, 20, and 50 mg) over a period of 20

weeks. Each participant was initiated on 25 mg before being randomly assigned to one of the three dosage groups. Participants (47% of whom were also cocaine users) were provided with individual and group therapy as well as other ancillary services. Researchers compared retention rates as well as levels of opioid use and found a dose-response relationship on both measures. Retention of participants at the end of 20 weeks stood at 52% in the 50-mg group, 42% in the 20-mg group, and 21% in the 0-mg group. Similarly, patients providing drug screens positive for opioids at 20 weeks consisted of 56% in the 50-mg group, 68% in the 20-mg group, and 74% in the 0-mg group (Strain, Stitzer, Liebson and Bigelow, 1993). In a cross-sectional study of 652 methadone patients, Hartel et al. (1995) found that patients receiving doses over 70 mg. tended to stay longer in treatment, had lower rates of opiate use and illicit substance use, as well as lower incidence of HIV infection and AIDS. The authors found that patients prescribed doses below 70 mg. had 2.1 greater likelihood of using heroin (Hartel et al., 1995). More recently, through a meta-analysis of 18 randomized controlled trials, Bao et al. (2009) found that higher doses of methadone and individualization of doses are both independently associated with better retention in MMT as well as with a reduction in illicit substance use.

Despite the significant body of research highlighting the efficacy of providing higher methadone doses, dosing practices vary. In a national review of dosing procedures between 1988 and 2005 in methadone treatment facilities, Pollack and D'Aunno (2008) saw a significant increase in the provision of adequate dosages and found that 2005 had the highest levels of dose adequacy. Despite the noted progress, researchers found that one third of methadone facilities continued to fall below recommended levels, writing that in 2005, “Forty-four percent of patients receive doses of at least 80 mg/day—the threshold identified as recommended practice in recent work. Thirty-four percent of patients receive doses below 60 mg/day, while 17 percent receive doses below 40 mg/day” (p. 2143). The inadequacy of dosing procedures is consistent with the

few additional studies that have reviewed the subject (D'Aunno & Vaughn, 1992; D'Aunno & Pollack, 2002).

A second reason why patients may not benefit from MMT is due to stigma. Stancliff, Myers, Steiner, and Drucker (2002) found that due to perceived stigma, 58% of patients did not communicate with friends and family about their methadone status and 42% did not inform their physicians. Factors such as the time it takes to receive daily doses, the need to explain to others where they go daily, or being witnessed attending a methadone treatment facility, may impact patients' willingness to attend daily medication days. From ten years of interviews with patients on MMT, Murphy and Irwin (2012) found that patients frequently felt they experienced a marginal identity which was "shrouded in anguish and secrecy. Methadone patients were in a kind of identity limbo; a holding pattern between two extremely different social worlds" (p. 257). Multiple studies confirm the prevalence of stigma associated with MMT (Conner & Rosen, 2008; Earnshaw, Smith, & Copenhaver, 2013).

A third reason why patients may not benefit from MMT is due to government regulations that may limit the availability of MMT programs. In 1995, the Institute of Medicine released a report in which they argued that the Federal regulations restricted access to treatment and the prevalence of programs, writing that many of the current requirements were "excessively intrusive into medical practice, inimical to proper patient care and public health, and unnecessary to protect public safety" (Yarmolinsky & Rettig, 1995, p. 148). In 1998 The National Institute of Health echoed these sentiments, recommending "expanding the availability of opiate agonist treatment" and the reduction of all "unnecessary regulation of MMT" (Consensus Conference, N.I.H., 1998, p. 1938). In a review of the literature, Joseph et al., (2000) write of the "need to expand the program to treat hundreds of thousands of untreated heroin users," (p. 361-362)

highlighting the numerous calls for the expansion of methadone maintenance through the “training of more health personnel, the easing of regulations on federal, state and local levels to permit the opening of new programs, and the development of new models of treatment” (p. 361-362).

Patient Engagement and Retention

The overregulation of MMT programs, as well as the presence of stigma and inadequate dosing practices, are only some of the many impediments that MMT providers face in administering effective treatment. Providers often serve clientele who experience homelessness or unstable living environments, involvement with the criminal justice system, and cooccurring psychiatric diagnosis. Programs are frequently underfunded and under supported. The result of this web of obstacles is that patients frequently disengage from treatment or withdrawal all together.

While overall retention rates are difficult to accurately pinpoint, Bao et al. (2009) found that reported retention rates at different points in treatment ranged from as low as 20% to as high as 96.4%. The vast majority of research illustrates that retention is a critical issue for MMT providers. Ball and Ross (2012) found that nearly half of patients who begin MMT treatment are no longer enrolled by the end of the first year. Bell, Burrell, Indig, and Gilmour (2006) found that among 477 methadone patients, only 51% had retained in treatment at 6 months. The authors write that “The most striking observation from the current study was the high turnover of patients; cycling in and out of treatment was common. Nearly two-thirds of people left treatment within, and two-thirds of those who left returned, often for multiple episodes” (p. 60). Magura, Nwakeze and Demsky (1998) found that among a sample of 1206 admission to six MMT clinics

in New York City, the estimated median treatment duration was 23 months, with 38% having retained at three years. Other studies have found even lower estimates of retention with some reporting 31% at four months (Johnson, Jaffe, & Fudala, 1992) 56% at four months (Strain, Liebson & Bigelow, 1994) and 31% at 12 months (Ling, Wesson, Charuvastra, & Klett, 1996).

Pennsylvania: Systems Coordination and Social Services

In the previous section, this paper introduced the problem of patient engagement and retention in MMT treatment and the structural obstacles that providers face in implementing effective treatment. It will now turn its focus to the specific example of Pennsylvania, a state which implemented a new program focused on improving systems coordination and the provision of social services to address the problem of patient disengagement and underutilization of opioid addiction treatment. The Pennsylvania Department of Drug and Alcohol Programs has focused on the provision of “continuing care,” the coordination of all stages of an individual’s substance abuse treatment following their initial treatment episode (Naeger, Mutter, Ali, Mark, & Hughey, 2016). The continuing care approach breaks from prior treatment models in which addiction was treated through acute episodes of care. Research and clinical experience have shown that patients frequently require multiple episodes of treatment to achieve and sustain recovery (Coffin et al. 2007; Dennis & Scott, 2007). Through the treatment of addiction as a potentially chronic disorder, coordinated care aims to ensure that patients have access to the appropriate level of care at all stages of their addiction.

While opioid addiction impacts individuals from all socioeconomic strata, its damages continue to be most chronically debilitating for unempowered and under-resourced groups. Attention to this fact has stretched back to the beginning of MMT, and because of this, the

provision of social services has remained a critical component of treatment (Zanis, McLellan, Alterman, & Cnaan, 1996). As Joseph, Stancliff, & Langrod (2000) wrote, policy developers and service providers such as the National Institute of Health and Institute of Medicine, have “defined narcotic addiction as a chronic medical disorder and have claimed that methadone maintenance *coupled with social services* is the most effective treatment for this condition” (p. 348, italics added). The provision of services such as talk therapy, methadone maintenance, or psychiatric medication may not be effective if patients are unable to obtain necessities such as housing, transportation, or food. Literature on the importance of social services throughout addiction treatment frequently supports its efficacy (Marsh, D'Aunno, & Smith, 2000; McLellan, et al. 1998).

Recent years have shown an increased need for an effectively coordinated and socially supportive substance abuse treatment system in Pennsylvania. In 2016, Pennsylvania experienced 4,627 drug overdose deaths and averaged 37.9 overdoses per 100,000 people, the fourth highest rate of drug overdoses among the States (Rudd, Aleshire, Zibbell, & Gladden, 2016). Opioid overdoses in Pennsylvania increased 12.9% from 2013-2014, 20.9% from 2014-2015, and 44.1% from 2015-2016 (Rudd, Aleshire, Zibbell, & Gladden, 2016; Hedegaard, Warner, & Miniño, 2017). In 2014, Pennsylvania also experienced the third highest number of fentanyl seizures in the country with 419 seizures, outranked only by Massachusetts (630) and Ohio (1245) (CDC, 2015). The CDC found that between 2016 and 2017, emergency room visits for opioid overdose increased by at least 30% within 45 states and increased by over 50% in Pennsylvania (CDC, 2018).

The Centers of Excellence

Recent initiatives from Governor Tom Wolf, the Department of Health and the Pennsylvania Department of Drug and Alcohol Programs, have begun to address the ongoing statewide opioid crisis. These initiatives have targeted improving access and retention to treatment, with the goal of integrating behavioral and primary healthcare (Governor Tom Wolf, 2016). In 2016, the Governor Wolf administration launched the Centers of Excellence (COE) initiative. Forty-five organizations were identified as COE and received funding from the Department of Human Services to expand access to opioid treatment through the enhancement of coordinated care. In February of 2018, Wolf applauded the success of the initiative, stating that “With these centers, individuals suffering from OUD [opioid use disorders] have access to treatment in their communities for the whole person, instead of just the disease” (Nexstar Broadcasting Inc., 2018) Wolf’s office reported that as of February, 2018, over 14,000 individuals had visited a COE and 72 percent of them had engaged in some form of treatment, including inpatient and medication assisted treatments (Nexstar Broadcasting Inc., 2018).

Among the first group of programs to become identified as a COE, Thomas Jefferson University Hospital Narcotic Addiction Rehabilitation Program (NARP) provides outpatient MMT as well as a range of therapeutic, psychiatric, and behavioral health services. Located in South Philadelphia, NARP has utilized COE funding to develop a care management team that partners with the Emergency Department of Methodist Hospital, a Jefferson Health hospital also located in, and serving the residents of, South Philadelphia. The care management team consists of three masters level clinicians serving as certified recovery specialists (CRS) and a peer specialist. Working closely with the emergency department’s social workers, case managers, and resident physicians, the care management team works to expedite patient entry into OUD

treatment. This approach has been in response to a perceived lack of coordination between the ER and substance abuse treatment programs. Historically, patients who entered the emergency room for opioid related issues often received limited support in accessing treatment. Frequently, they were simply handed a list of recommended treatment centers when discharged. Indeed, this lack of treatment coordination represents a barrier to MMT utilization. As a COE, TJUH is changing this, with the goal of ensuring that “people with opioid-related substance use disorder stay in treatment to receive follow-up care and are supported within their communities” (Pennsylvania Department of Drug and Alcohol Programs, 2018, p. 2).

To ensure that they have the time and ability to provide patients with face to face support and engagement, the CRS split their time between NARP and Methodist Hospital and maintain small caseloads. When a patient shows up to the emergency room for opioid related issues, they will be placed in contact with a CRS. First, the CRS will engage the patient and attempt to build rapport. Second, utilizing a screening tool, the CRS will assess the patient’s level of need and identify whether they meet requirements for inpatient treatment. The COE does not stipulate which form of treatment patients access, however, they will generally recommend patients enter a detox or rehabilitation program prior to entering MMT. As will be discussed, recent evidence suggests that patients may perform better on MMT when entering from a detox or rehabilitation program (Sterling, Loscalzo, Rannazzisi, & Morley, 2018). If the patient is not interested in pursuing treatment, the CRS will provide information regarding available community supports. If the patient does choose to enter treatment, the CRS will function in a supportive role for 30 days, engaging them through phone or in-person consultations. While the nature of this support varies depending on the needs of the patient as well the type of treatment they enter, the recovery specialist will be available to work with the patient to address challenges they may be

experiencing in treatment initiation and engagement. Like a case manager, CRS help patients address issues around accessing services, such as low-cost housing, transportation, or community supports. They may work with patients to address issues including employment, medical concerns, and family problems. However, the focus of their work is on treatment engagement. If the patient chooses to receive MMT at NARP, the recovery specialist will provide support through in-person meetings. These meetings will include the completion of an initial treatment plan as well as working to ensure that patients obtain methadone stabilization. For example, many patients may find it difficult to communicate with medical staff, and CRS will collaborate with psychiatrists to advocate for patients' needs and to help them to obtain an adequate dose.

There are a few important reasons why the ER has been targeted as a site to direct patients into treatment. The ER is a central point of contact between people with OUDs and the treatment system. Individuals with substance abuse disorders may frequently view the ER as the most accessible form of medical treatment and are 30% more likely to use the emergency department than occasional or non-drug using individuals (Falik, Needleman, Wells, & Korb, 2001). For example, opioid users often utilize the ER for treatment of endocarditis, cellulitis, pneumonia, overdose, as well as to engage in drug seeking behavior (Larson, Saitz, Horton, Lloyd-Travaglini, & Samet, 2006). The CDC writes that the ER is also an opportune chance for directing high-risk opioid abusers into MMT, writing that "People who have had an overdose are more likely to have another, so being seen in the ED is an opportunity for action. Repeat overdoses may be prevented with medication-assisted treatment" (CDC, 2018, para. 1). Indeed, research illustrates that prior overdose is the highest predictor of subsequent overdose and overdose death (Coffin, et al., 2007; Darke, Mills, Ross, & Teesson, 2011).

Patients in the emergency room for opioid related problems may also be undergoing painful experiences, such as overdose or viral infections, that increase their motivation to enter treatment. While research is mixed, there is some evidence to suggest that adverse substance related experiences can be pivotal points in a patient's recovery (Pollini, McCall, Meht, Vlahov, Strathdee, 2006). Schütz, Rapiti, Vlahov, and Anthony (1994), for example, found that among 1,039 intravenous drug users, recent drug overdose was an independent predictor of entry into a detoxification program. Additionally, The ER has a unique set of resources to conduct these transitions, as Sapatkin (2017) of the Philadelphia Inquirer writes, the ER is an "ideal place to intervene. A revived patient has just experienced a potentially life-changing event. Hospitals have resources, including doctors and nurses who are passionate about saving lives" (para. 8).

The positioning of CRS within the ER is an important component of the program as it allows for the implementation of "warm hand-offs," face-to-face transitions of patients between caregivers. The Pennsylvania Department of Drug and Alcohol Prevention (2018) defines warm hand-offs as "where a physical health provider facilitates the process for direct referral to SUD treatment. Similar to a heart attack patient who, once stable in the emergency department, would receive a facilitated referral to a cardiologist, opioid use disorder patients should receive facilitated referral to SUD treatment" (para. 4). The department declared that it is now a state mandate that patients who enter the ER due to overdose are offered a warm hand-off. The chart on page 72 illustrates the warm handoff procedure.

The Therapeutic Alliance

Following the implementation of the COE, all patients who choose to begin MMT at NARP (regardless of their referral route) are provided 30 days of support from a CRS. In this

model, patients are administered a higher level of therapeutic support during treatment initiation as compared to prior initiation methods. This shift in MMT admission practice can be understood through the concept of the therapeutic alliance. In psychotherapy, the beginning stage of treatment involves the development of a therapeutic alliance. Therapeutic alliance is considered a transtheoretical concept due to its utilization in a multitude of theoretical models and some have argued that it is a common factor that accounts for effectiveness across modalities (see Ahn and Wampold, 2001). The concept suggests that the development of a positive bond or a “working alliance” is a foundational element for any therapeutic work to take place and that this relationship is a mechanism through which change occurs. The concept of the alliance was first developed in Freud’s early writings, in which he discussed the relational dynamics and transference that occurred between the therapist and client (Freud, 1912). Since then, it has taken a prominent role in the psychotherapy literature. Greeson (1971) defined the therapeutic alliance as “The ability of the client and counselor to work together purposefully to achieve agreed upon goals” (p. 216). In this process, the therapist works to create a bond that instills a sense of partnership, safety, and support. Horvath and Bedi (2002) suggest that the alliance involves the formation of the respective roles of the therapy participants as well as the belief that each are committed to fulfilling these tasks. The authors write that the alliance consists of “the positive affective bonds between client and therapist, such as mutual trust, liking, respect, and caring. Alliance also encompasses the more cognitive aspects of the therapy relationship; consensus about, and active commitment to, the goals of therapy and to the means by which these goals can be reached” (Horvath and Bedi, 2002, p. 38). The authors explain that while the development of the therapeutic alliance may occur throughout treatment, it most significantly occurs within the initial sessions.

The correlation between the strength of the therapeutic alliance and treatment adherence is well documented. A positive therapeutic alliance has been found to improve treatment outcomes across a range of treatment modalities and patient diagnosis (Horvath, 2001). Multiple meta-analysis have found a relationship between therapeutic alliance and outcomes, particularly in the realm of treatment retention and engagement (Horvath & Symonds, 1991; Martin, Garske, & Davis 2000; Sharf, Primavera, & Diener, 2010) Reflecting on the relationship between therapeutic alliance and outcomes, Horvath (2001) writes that “the magnitude of this relation appears to be independent of the type of therapy and whether the outcome is assessed from the perspective of the therapist, client, or observer” (p. 365). Research focusing specifically on substance abuse treatment has also confirmed this relationship. Through a literature review of 18 studies that investigated the impact of the therapeutic alliance in substance abuse treatment, Meier, Barrowclough, & Donmall (2005) conclude that “early therapeutic alliance appears to be a consistent predictor of engagement and retention in drug treatment” (p. 2004). Joe, Simpson, Dansereau, and Rowan-Szal (2001) found that counseling rapport (a measure of the therapeutic alliance) contributed explicitly to patient outcomes in MMT, independent of treatment retention. The authors found that the therapeutic alliance, in and of itself, correlated with patient outcomes of cocaine use and criminality after treatment, regardless of how long patients stayed in treatment.

Systems theory suggests that the therapy relationship does not exist between two people, but rather, involves the interaction between multiple systems and that this occurs at the individual, group, and organizational level. Understood through a systems theory lens, the therapeutic alliance can be expanded to include the patient’s relationship towards the organization within which the treatment occurs. As Pinsof (1994) writes, “The alliance can no

longer just be viewed as an alliance between individuals-regardless of who is in the therapy room. The alliance exists within the therapy system, between and within therapist and patient systems” (Pinsof,1994). This is particularly relevant for MMT, in which patients are required to attend the clinic daily for medication doses and often experience complex relationships towards the clinic. Indeed, a common subject in both individual and group therapy at NARP is the patient’s feelings toward the program, including feelings about clinic personnel, treatment requirements, the efficacy of methadone, the condition of the clinic building, and many other subjects.

While the CRS are not engaging in a psychotherapy relationship (the relationship itself lasts 30 days and does not necessarily involve psychotherapy, however, the concept of the therapeutic alliance has been expanded to include case management. See Kondrat and Early, 2010), they are responsible for developing the initial alliance between the patient and the clinic. One can speculate that the quality of this connection may impact the patient’s relationship with the counselor (with whom they will be transferred to) as well as their treatment trajectory. In this sense, the therapeutic alliance concept can be expanded to involve the patient’s alliance with NARP, including the patient’s attachment to the clinic, their willingness to trust in the staff, and their belief that the clinic is invested in promoting their wellbeing. Indeed, it is at this stage of treatment when instillation of hope and goal setting occurs, both critical components of the therapeutic alliance and the overall treatment process.

Chapter 4

Research Design and Methods

The prior section explored the challenges that MMT providers face in implementing effective practice, focusing specifically on the structure of the COE in Pennsylvania, an example of a program that addressed these obstacles through efforts at improved systems coordination and the implementation of social services. It concluded with a discussion of the critical position the CRS hold in forming a therapeutic alliance with new patients as they begin MMT. While clinical intuition suggests that this program will help to improve patient outcomes, innovative programs such as the COE require evaluation to ensure that they are effective in meeting their goals. There are several reasons why this research is important. First, this researcher was unable to find research that focused specifically on this type of program, suggesting a dearth in the literature on this subject. Second, for states to invest in programs such as the COE, it is important to know that these programs are worth the financial investment. Because these programs are state funded, taxpayers want to know that their tax dollars are being invested wisely. Third, MMT experiences low political popularity in the U.S. In 2015, a survey among a small sample of Americans found that only 19% were in support of opioid users seeking MMT and 50% believed that individuals with OUDs should quit without any form of opiate replacement therapy (YouGov, 2015). Shifting public opinion through evidence can help to build support for life saving programs.

Lastly, it is important for both clinicians and policy makers to have a nuanced understanding of how programs are impacting patient outcomes. For clinicians, understanding the most effective methods for patient engagement is necessary to catch the most at-risk users who frequently fall through the cracks of the treatment system. For policy makers, knowing what

policies are effective, as well as what may be causing any unintended consequences, is paramount. For example, if the COE appears to be improving patient retention rates, but not reducing rates of opioid use, this knowledge is critical for policy makers to be able to make the necessary programmatic changes. This leads to many questions regarding the program's performance, including: How do the supportive services of the COE during the early stages of effect patient outcomes? If positive gains are obtained, do these benefits sustain at different stages in treatment? What aspects of patient outcomes do these programs benefit? These are the questions that this paper intends to answer.

Specific Aim One

The current study will have two specific aims. The first specific aim is to evaluate the efficacy of the COE in improving MMT patient outcomes. This evaluation will be conducted through a comparison of the outcomes of MMT patients at TJUH NARP who received the **supportive services of the COE** with those who received **treatment as usual**. These will be the two groups that compose the independent variable utilized. Four dependent variables will be utilized as measures of patient progress. These include: **patient engagement**, **attendance to medication days**, **opioid status**, and **time to stabilization** (see page 44 for dependent variable definitions).

The hypothesis of this dissertation, as derived from the first specific aim, is that patients who receive the **supportive services of the COE** will have increased **patient engagement** ^(H1), attend a higher number of **medication days** ^(H2), have an improved **opioid status** ^(H3), and experience a reduced **time to stabilization** ^(H4) when compared to a comparison of admissions admitted prior to the institution of the COE.

Specific Aim Two

The second specific aim is to identify predictors of outcome within and across the conditions. This endeavor is exploratory in design and does not have a hypothesis. Relationships between patient characteristics and outcomes will be analyzed for statistical significance. Significant findings will be discussed for their implications regarding patient characteristics that may impact the course of MMT treatment. It will also shine light on patient patterns of engagement and overall outcomes during the early stages of MMT.

Sample and Time Frame

Patient engagement, attendance to medication days, and opioid status will be measured at 3, 6, and 9 months. The control group (N1=57) consists of patients who were admitted to MMT at TJU NARP between the dates August 1st and November 30th of 2016. The treatment group (N2=57) includes patients who were admitted a year later between August 1st and November 30th of 2017, following the implementation of the COE (see Chapter 5 for a discussion on group comparison). To meet inclusion criteria, it was required that patients be admitted into intensive outpatient (IOP) and be funded by Community Behavioral Health (Medicaid). Patients who were fee-payers (paid for their treatment out-of-pocket) or who were admitted into outpatient (OP) level of care were excluded from the study (see page 48 for a description of the IOP and OP programs). All patients included in the study were age 18 or above. To be admitted into TJU NARP, all patients have met criteria for a current opioid use disorder as defined by the DSM IV (American Psychiatric Association, 2013) and have documented use of greater than one year. Randomization was not possible in this context due to issues of feasibility. Of 123 patients, 5

were identified as OP level of care, and 4 were found to be feepayers, leaving 114 patients within the study. Data from all 114 were utilized in the final analysis.

This sample and time frame were chosen for several reasons. The COE program was fully implemented into the clinical program in June of 2017. This involved the appointment of a director and the hiring of two masters-level clinicians as certified recovery specialists (CRS). Beginning in June, the CRS began to provide all new patients on MMT at NARP with 30 days of supportive counselling, case management, and support around treatment engagement. They also began to serve as liaison to the emergency room and to coordinate with local substance abuse treatment programs. By choosing 9 months, the study will allow for the evaluation of patients who were admitted within a three-month time frame, thereby increasing the sample size. While a full year treatment duration may provide greater information on patient outcomes, this would also require a reduction in sample size, since the timeframe in which patients were evaluated would overlap with the time in which this research paper is written. A larger sample size is deemed more important than time spent in treatment due to the small difference expected between groups.

While it is the hypothesis of this paper that patients receiving the support of the COE will have increased engagement (related to H1), attend a higher number of medication days (related to H2), have lower numbers of opioid positive drug screens (related to H3), and become stabilized within shorter periods of time (related to H4) compared to those provided treatment as usual, the difference is not expected to be large, and therefore increasing the sample size is prioritized. This will allow for greater and more specific insight into how groups differ in performance. Additionally, this time frame will allow for both groups to have been admitted during the same time of year, thereby accounting for time of year differences that may impact patient performance. Finally,

this paper is focused on patient engagement during the initial stages of treatment, not long-term patient outcomes. While long-term outcomes are the central aims of treatment, there is a relationship between successful engagement during the initial treatment and long-term outcomes, and therefore, focusing on short term engagement is justified.

Study Design

Initially, a match case-control study was considered, however, based on demographic controls of gender, race, and age, an insufficient number of matches were obtained. Other methods of evaluating the COE, were also considered and rejected. Tracking patients served by the COE in the emergency room was considered, however, there are many challenges in this approach. For example, mandated by confidentiality policies, treatment programs are generally unable to provide information on patient outcomes, therefore limiting the ability of COE to track outcomes of patients who attend programs other than TJUH NARP. However, at TJUH NARP, the provision of COE support to all incoming patients presents as an opportune chance to assess whether such supports are effective for improving MMT outcomes.

The current case-comparison method was found to be feasible to conduct. No funds, travel, or additional personnel were necessary for this approach and issues of privacy and confidentiality were easily addressed. This author was granted permission by TJU NARP director to access charts of patients who received MMT at NARP. Patient confidentiality was maintained by replacing patient names with numerical identifiers and erasing the document connecting patient names to data. The author collected patient data from TJU's computer database on location at TJU NARP. Patient IOP attendance hours were obtained from billing documentation and clinical and demographic data from the clinical charts.

Independent Variable

Patients in the treatment group received the **supportive services of the COE** for the first 30 days of treatment including the availability of regular meetings to address case management needs, issues of treatment engagement, as well as the completion of initial treatment documentation. Following the initial thirty days, patients were transferred to an addictions counselor. Patients in the control group received **treatment-as-usual**, in which they were initiated and maintained with an addictions counselor who provide addictions therapy and counselling.

Both CRS and addictions counselors are masters level clinicians with backgrounds that include social work, counselling, and psychology. However, the services provided by the CRS differ from that of the addiction counselors in two fundamental ways. First, CRS provide a higher level of support through increased meetings, availability, and contact. The CRS maintain caseloads of 5-7 patients and are therefore able to meet with patients as frequently as needed. A CRS might meet with a patient daily for in-person meetings or maintain regular contact on the phone if necessary. CRS will also contact patients when they miss a day of treatment. In contrast, addictions counselors maintain caseloads ranging from 25-35 patients and lack the time to reach out each time patients miss treatment. Patients are scheduled for weekly or monthly meetings lasting 30-50 minutes depending on the patient's level of care.

Second, the work conducted with the CRS is qualitatively different from that of the substance abuse counselors, placing greater focus on issues of treatment engagement, case management and care coordination. To address issues of treatment engagement, CRS communicate directly with psychiatric and medical staff to ensure that patients are able to obtain an adequate methadone dosage, as well as any additional psychiatric or medical services they

may require. While addictions counselor may engage in this communication as well, they generally only do so in more severe cases when patients are struggling to become stabilized. The CRS, however, work with each of their patients to ensure their methadone and medication needs are being addressed. The CRS also place specific focus on case management related needs, including finding low cost housing, medical or insurance related issues, or issues of transportation. Lastly, CRS are provided an extensive knowledge of local resources and treatment providers and will work to connect patients with any needed services.

In contrast, addictions counselors provide addiction focused psychotherapy, including modalities such as cognitive behavioral therapy and motivational interviewing. While some of the interventions provided by addictions counselors may overlap with the CRS, the focus is different. For example, an addiction counselor who practices CBT may focus on self-limiting behaviors and thoughts that lead to relapse, while a CRS might focus on finding substance abuse free housing. While addictions counselors also connect patients with resources, they have a reduced focus on this issue and place greater emphasis on patient psychosocial functioning. Therefore, the two interventions (the COE and treatment-as-usual) are different both in terms of level of support and focus of treatment.

While both groups were initiated into the program through different levels of support, both were admitted into the IOP program where they received group therapy. Patients receiving MMT at TJU NARP are assigned to one of two therapy programs, OP and IOP. Patients admitted into the IOP program are required to attend 9 hours of group therapy each week. The therapy groups, run by addictions counselors, are process groups that utilize a variety of psychotherapy orientations including cognitive behavioral therapy, art and expressive therapies, as well as psychoeducation on substance abuse and recovery. After providing multiple clean drug screens,

patients may step up to OP, in which the group therapy requirement is dropped. Only patients enrolled in IOP were included in both the control and treatment group.

Dependent Variables

This dissertation has four hypotheses: that the supportive services of the COE will positively impact **patient engagement** ^(H1), **medication days** ^(H2), **opioid status** ^(H3) and **time to stabilization** ^(H4). These variables are defined below:

Providers of MMT struggle daily with issues of **patient engagement** ^(related to H 1), *the continued attendance to therapy following the initiation of treatment*. Both research and clinical experience have shown that patients frequently drop-out having never obtained the therapeutic gains of treatment. Multiple studies have found that time spent in treatment is one of the most important predictors of patient outcomes and that longer durations in treatment have more positive outcomes (Bao et al., 2009; Degenhardt et al., 2011; Oliver et al., 2010; Simpson, 1981; Simpson, Joe, & Brown, 1997; Soyka, Zingg, Koller, & Kuefner, 2008; Villafranca, McKellar, Trafton, & Humphreys, 2006). While recommended duration of treatment varies, 12 months is generally considered a minimum length of treatment to obtain positive benefits (NIDA, 2018). Premature termination of treatment has been linked with negative outcomes, for example, through a large-scale study of MMT programs in North America, Ball and Ross (2012) found that 82% of patients who left treatment had relapsed by 12 months.

Patients on MMT may also attend sporadically, missing **medication days** ^(related to H 2), *the daily attendance to the MMT clinic to receive methadone doses*. When a person is first initiated on methadone at NARP, they receive a low dose of 15-20 mg. and must attend daily to have their dosage gradually increased. If they miss a day, their dosage is reduced, and if they continually

miss, they will not receive the necessary increases to obtain a therapeutic dose (TD). These patients may attend an adequate number of days to avoid discharge while never obtaining an adequate dose, and therefore never eliminating their illicit substance use or fully benefiting from therapeutic and psychiatric services. These patients utilize clinic resources while failing to fully benefit from MMT services. Research illustrates that patient outcomes are predicated on the obtainment of a TD, as well as on retention in treatment, and that these two factors are correlated (Gerra, et al. 2003; Gossop, Marsden, Stewart, & Treacy, 2001).

An overarching goal of all MMT is the elimination of opioid use. **Opioid status** (related to H₃), *the ratio of opioid negative to positive drug screens provided*, is therefore a critical signifier of treatment efficacy. During the early stages of treatment, when patients are generally positive for opioids, prescribing psychiatrists aim to attenuate symptoms of withdrawal, reduce opioid craving, and eventually arrive at a stabilizing dose, while avoiding sedation or euphoria through overmedication. Methadone is stored primarily in the liver for an average of 24 to 36 hours, although this may differ between patients, and can range from 4 to 91 hours (Baxter et al., 2013). Because of methadone's long half-life, achieving steady-state serum methadone levels, in which drug elimination is in balance with the amount of drug remaining in the body, requires an average of four to five days, however, this also differs between patients (Baxter et al., 2013). Because of this, as well as regulations regarding how quickly a dosage can be increased, it will generally take patients 2-3 weeks to obtain a TD. A patient has successfully obtained a TD when the patient's dosage is effectively blocking the effects of opioid use, as well as reducing withdrawal and craving for at least 24 hours. At this point, methadone dosages are generally kept consistent, however, they may be adjusted based on patient dose responses. For example, if patients relapse doses may be increased, or, if patients appear sedated, doses may be decreased.

Patients who are providing opioid negative drug screens have generally become stabilized on methadone. Stabilization for this study will be defined as the provision of four consecutive opioid negative drug screens while maintained on an unchanged dosage of methadone. **Time to stabilization** (related to H 4) is defined as *the number of days on treatment until a patient obtains stabilization*. This variable has been chosen for several reasons. First, providing four consecutive opioid negative drug screens implies that the patient has securely obtained abstinence from opioids. Patients may at times provide one or more opioid negative drug screens while continuing to utilize opioids, therefore, this definition provides greater evidence that patients have successfully maintained abstinence. Second, the obtainment of a TD implies that a patient's dosage generally should not be changed. While changes in dose can occur for multiple reasons, these changes are often a sign that a patient has not yet obtained an adequate dosage, that they are continuing to utilize illicit substances, or that they are struggling with attendance. Third, a central goal of the COE is to improve patient engagement during the initial stages of treatment. Therefore, it is important to assess whether patients admitted through the COE are becoming stabilized with greater speed. For MMT clinics with limited resources, ensuring that patients are becoming stabilized quickly is important to improve program efficiency as well as overall outcomes. The time with which patients are achieving stabilization is one clear indicator of how successful MMT programs are in supporting patients' ability to overcome barriers to treatment engagement.

Dependent Variable Definitions

Patient Engagement:

The number of units of IOP therapy the patient received in months 1-3, 4-6 and 7-9.

Medication Days:

1. The number of medication doses administered to the patient in months 1-3, 4-6, and 7-9.
2. The total number of doses administered to the patient throughout months 1-9.
3. The total number of milligrams administered to the patient throughout months 1-9.

Opioid Status:

The proportion of opioid negative to positive urine drug screens provided in months 1-3, 4-6, and 7-9.

Time to stabilization:

1. Has the patient provided four consecutive opioid negative drug screens while maintained on an unchanged dosage of methadone? Y/N
2. If stabilization is obtained, the number of days since the patient's admittance date until stabilization.

Background Variables

Demographic and clinical data was obtained from the clinical assessment interview completed by the clinic intake coordinator upon patient admission. These variables were chosen because of their documented importance for impacting addiction treatment as well as for their availability. A brief discussion of these variables is provided below and followed by their definitions.

Gender may impact entry method into treatment. Men's initiation into treatment may be more likely facilitated by social institutions such as employment or the criminal justice system, whereas women are more likely to receive a referral (Grella & Joshi, 1999). Men tend to show

up in greater numbers to MMT programs, with some estimating as high as two thirds of MMT patients being male (Chatham, Hiller, Rowan-Szal, Joe, & Simpson, 1999). Men may take longer to enter treatment following their initial opioid use whereas women have been found to move from opioid use to dependence with greater speed (Back, et al., 2011). Men and women may also report qualitative differences in their experience of opioid addiction, for example, women tend to report greater psychological, medical, and family of origin problems (McHugh, et al. 2013) and a greater tendency to report misuse of opioids due to emotional issues and affective distress, while men tend to report opioid use as a response to legal and behavioral issues (Jamison, Butler, Budman, Edwards & Wasan, 2010).

Race has been noted in the research as impacting the outcomes of addiction treatment, with Black and Hispanic patients less likely to complete addiction treatment (Banta-Green, Maynard, Koepsell, Wells, & Donovan, 2009; Saloner & Cook, 2013). Black patients have also been found to receive lower dosages (Pollack & D'Aunno, 2008). These findings may be due to a lack of resources in clinics serving communities of color, biased attitudes of staff, as well as structural and socioeconomic disparities.

Age may also serve as an influencing factor in MMT retention. Older patients have a higher likelihood of remaining in treatment (Banta-Green, Maynard, Koepsell, Wells, & Donovan, 2009) however, may be at greater risk for overdose after leaving treatment (Clausen, Waal, Thoresen, & Gossop, 2009).

Patient **referral source** has recently been identified as a factor impacting MMT patient retention. Patients frequently self-refer to MMT programs, entering treatment without a referral or prior methadone stabilization. Researchers at TJU NARP found that MMT patients who entered treatment from a referral, such as through an inpatient treatment program, obtained

significantly fewer opioid positive drug screens, were administered a greater number of milligrams, and were ultimately more likely to obtain abstinence from opioids (Sterling, Loscalzo, Rannazzisi, & Morley, 2018). While the research is preliminary and small in scale (N=20), the researchers write that the findings “lead us to question whether traditional self-referral routes of entry into outpatient MAT need to be re-considered. If confirmed on a larger sample, these findings point to a need for inpatient stabilization prior to enrollment in outpatient MAT” (para. 5).

The number of years of **opioid use** as well as the engagement in **intravenous drug use** are both indicators of the severity of patient addiction. It was important for this researcher to confirm that both patient groups were comparable in these measures, as addiction severity can impact the course of MMT. Patients with longer histories of opioid use may have greater difficulty in eliminating their opioid use as well as higher rates of physical and psychiatric disorders (Naji et al., 2017). Intravenous drug users have been found to be at higher risk for HIV (Mathers et al. 2008) Hepatitis C (Nelson, et al. 2011) and overdose (Darke & Hall, 2003). They have also been found to have higher rates of homelessness, unemployment, and long-term and earlier heroin use (Neaigus, et al., 2001). These factors may impact the ability of patients to attend and engage in treatment as well as to reduce or eliminate their opioid use.

The **presence of a mental health diagnosis** is another factor that complicates opioid addiction and recovery. Patients with psychiatric illness tend to have a worse course of addiction illness as well to exhibit greater treatment resistance (Brady & Sinha, 2005; Brady & Sonne, 1995; Brooner, King, Kidorf, Schmidt, & Bigelow, 1997) These patients may require more frequent hospitalizations (Brady & Sonne, 1995), require higher doses to become stabilized (Maremmani et al., (2000), and have a greater risk for drug related mortality (Cousins, et al.

2011). A post-traumatic stress disorder (PTSD) diagnosis places patients at a greater risk for relapse and patients with elevated cortisol levels (a symptom of PTSD and stress) have higher risk for early MMT termination (Jaremko, Sterling, & Van Bockstaele 2015). Symptoms of depression and anxiety have also been linked to premature termination (Lejuez et al. 2008). These patients may not receive the adequate level of mental health care or social supports necessary to supplement outpatient MMT.

Patients with a higher **number of arrests** and involvement with the criminal justice system have been found to experience higher rates of attrition (Saxon, Wells, Fleming, Jackson & Calsyn, 1996; Magura, Nwakeze, & Demsky, 1998). Legal responsibilities and appointments, involvement in high risk behaviors and imprisonment may all impact a patient's ability to attend and engage in treatment.

Finally, it is well documented in the literature that time spent in treatment (operationalized in this study as **number of prior treatment episodes**) is one of the most important predictors of patient success (Bao et al., 2009; Degenhardt et al., 2011; Oliver et al., 2010; Simpson, 1981; Simpson, Joe, & Brown, 1997; Soyka, Zingg, Koller, & Kuefner, 2008; Villafranca, McKellar, Trafton, & Humphreys, 2006). These studies suggest that retention in treatment may be more important than engagement and that patients who maintain some form of attendance to treatment tend to have better outcomes than patients who leave early. Further, they show that addiction frequently requires multiple treatment episodes before a patient shows positive outcomes (Deck & Carlson, 2005). Patients who undergo multiple treatment episodes also tend to stay in treatment for progressively longer periods of time in later episodes (Nosyk et al., 2009). All of these studies suggest that simply keeping patients in treatment is an important and critical goal and that patient treatment history is an important predictor of success.

Sociodemographic and Clinical Variable Definitions

Gender: Categories of gender include male and female (no patient identified as transgender).

Race: Categories of race include Caucasian, Black, Hispanic, and Native American.

Age: The patient's age in years at the time of admission.

Referral Source: Did the patient enter treatment from a referral (treatment program referral, court referral, etc.) or were they self-referred.

Years of Opioid Use: The number of years since the patient first initiated opioid use.

Intravenous Drug Use: Does the patient use opioids intravenously. Y/N

Legal History: The number of arrests within twenty-four months prior to admission.

Mental Health History: Did the patient acquire a prior mental health diagnosis. Y/N

Number of Prior Treatment Episodes: The number of treatment episodes prior to admission to TJU NARP.

Hypothesis

Patients who receive the supportive services of the COE will have increased **patient engagement** ^(H1), attend a higher number of **medication days** ^(H2), have an improved **opioid status** ^(H3), and experience a reduced **time to stabilization** ^(H4) when compared to patients who receive treatment as usual.

Chapter 5

Study Findings

A Priori Differences

The first series of analyses were conducted to assess whether there were any a priori differences in the two groups. Chi-squared tests were conducted to assess for significance. Table 1 on page 67 displays the socio-demographic and clinical characteristics of the sample. Both the sample and treatment groups were found to have a similar ratio of male to female with a slightly larger percentage of males. Both groups have the highest percentage of Caucasian patients, with a smaller group of Black patients, followed by Hispanic patients. The treatment group had two patients of Native American background and the control group had none. Data was missing regarding clinical and demographic variables for five patients within the control group due to incomplete intake assessments. Chi-squared tests revealed only one significant a-priori difference between the groups. Patients in the treatment group were found to have a significantly greater likelihood of being admitted via a treatment-referral than through self-referral ($P=.001$).

Patients within the treatment group showed somewhat higher rates of intravenous drug use as well as mental health diagnosis, suggesting that this group may experience more severe pathology. However, chi-squared tests of association revealed no significant differences between groups on these measures. Apart from referral method, comparison between groups on demographic and clinical variables revealed no significant differences.

Analysis

Specific Aim One

The first specific aim of this dissertation was to evaluate the impact of the COE on MMT patient outcomes. The hypothesis is that patients who received the supportive services of the COE would have improved engagement (H₁), attend a higher number of medication days (H₂), have lower numbers of opioid positive drug screens (H₃), and become stabilized within shorter periods of time (H₄).

A series of T tests and chi-squared analyses were conducted to identify differences between the control and treatment group outcomes. Two significant statistical differences were found between the control and treatment group. First, the treatment group was revealed to have a significantly higher ratio of opioid negative to positive urinalysis during months 1-3 (P=.03). This effect was not found during months 4-6 and 7-9. Second, the treatment group had significantly lower rates of treatment attendance during month one (P=.04), month two (P=.05), month three (P=.02), and month four (P=.03). Analysis revealed no significant differences between the control and treatment group regarding medication days, methadone dosing, or time to stabilization. While non-significant, the treatment group was also found to have positive trends towards higher average medication doses (P=.13) and IOP attendance (P=.12) (See table 2 on page 68 for condition comparison data).

Specific Aim Two

The second specific aim of this paper was to identify significant predictors of patient outcomes and to provide data on patient patterns in the early stages of treatment. In pursuit of this aim, no hypothesis was utilized and descriptive statistics on patient performance in treatment were obtained. Chi-squared and T-tests were conducted to assess the relationships between patient characteristics and outcome indices.

Patients who entered treatment from a program transfer were found to have significantly higher average doses ($P=.02$). Transfer patients were also found to have a significantly higher ratio of opioid negative to positive urinalysis during the first three months of treatment as compared to the self-referral group ($P=.03$). This difference was not sustained at months 4-6 and 7-9. All other relationships between clinical and demographic variables and outcome measures were deemed insignificant (see table 3 on page 69 for data on the relationship of referral status and outcome indices).

Patient engagement, as defined by attendance to IOP therapy, was strongest during the early months of treatment, with the mean attendance rate in a negative correlation with the number of months of treatment. The same was found of medication days. However, the standard deviation for this group increased in later months of treatment, showing that the division between those attending, and those not, increased. These findings illustrate an overall pattern in which one group is becoming stabilized and consistently attending, while another group ceases to attend treatment at various points regardless of which group they were part of. The average number of days to stabilization (mean=89) illustrates that patients are taking roughly 3 months to become stabilized, however, 65 of 114 failed to obtain stabilization. Patient urinalysis show the lowest amounts of opioid use during months 4-6 and the highest amounts during 7-9 (see table four on page 70 for descriptive statistics of sample outcome variables).

Chapter 6

Discussion and Conclusion

Specific Aim One

The first specific aim of this project was to evaluate the efficacy of the COE program for its impact on patient engagement, attendance to medication days, opioid use, and time to stabilization. The results tell a mixed story regarding the COE and its impact on patient outcomes. The finding that patients entering through the COE experienced lower rates of opioid use during the first three months of treatment is compelling and suggests that the one-on-one support of the CRS may help in the transition from opioid use to maintenance on methadone. The finding that the treatment group had trends toward greater engagement and attendance also speaks to the impact of the COE. It is possible that the therapeutic relationships formed between patients and the CRS helped to improve some of the sample's attitudes and feelings towards MMT, to overcome barriers to treatment, and to obtain necessary supportive services. Additionally, the finding that the treatment group had a significantly higher number of transfer patients also illustrates the success of the COE's efforts towards systems coordination. It is likely that the work of the COE resulted in more patients entering treatment through treatment-referral rather than self-referral. This is a positive finding and points to the success that programs such as the COE can have in improving treatment coordination.

The lack of significant findings regarding patient opioid use during months 4-9, engagement in treatment, and attendance to medication days suggests that the COE may not be effective in producing longer term gains. The short-term nature of the COE program, in which CRS support is withdrawn after 30 days, may explain the lack of effect found during months 4-9. Additionally, while trends in engagement and attendance appear positive in the treatment group,

no additional significant findings are found regarding outcomes. There are a few possible reasons why more robust findings were not obtained in these areas.

One explanation for the finding is that this study held overly optimistic expectations regarding the potential of a short-term initiative for producing more long-term benefits. Neurological explanations of addiction suggest that relapse involves a hijacking of the executive functioning and inhibition systems of the brain (Lubman, Yücel, & Pantelis, 2004). In this process, individuals may have limited awareness of relationally based motivations for remaining sober, such as agreements formed between a patient and therapist. This failure of cognition is particularly debilitating for individuals with more severe addiction and it is these patients for whom methadone is frequently provided. Methadone patients often describe the impulse to use an illicit substance as involving a hyper-focus on short-term gains while losing sight of the impact the relapse might have on themselves or their relationships. This suggests that a relapse occurring at month nine of treatment may have little to do with the strength of a therapeutic alliance formed at month one. Therefore, patient results during months 4-9 may reflect the psychotherapy provided by the addiction counselors more so than the case management and supportive services provided by the COE.

A second explanation is that the outcomes are a result of an effect of history. Research suggests that in recent years opioid use has not only expanded but has also increased in severity. Opioid users are progressing from initial use into the development of opiate use disorders with greater speed and frequency (Nelson, Juurlink, & Perrone, 2015). These individuals are also using opioids through more lethal means such as heroin, a greater amount of which has been found to be laced with the toxic substance fentanyl (Cicero, Ellis, Surratt, & Kurtz, 2014). This

suggests that opioids users of more recent years, such as the treatment group, could be facing a greater severity of addiction.

In discussion with TJU NARP clinical staff, three additional factors emerged that may help to explain difficulties noted in establishing positive outcomes. First, staff identified motivation as a mediator of patient progress. Patients enter MMT with a varying motivation to progress through treatment. Clinical experience and research show that people may enter MMT with a range of motivations, from personal interest to external coercion from the criminal justice system (Zeldman, Ryan, & Fiscella, 2004). For many patients, attending group regularly, becoming stabilized, or providing abstinent urine drug screens, are not motivating/rewarding factors. Patients may utilize methadone to subsidize their current opioid use or simply to avoid overdose. These patients may have little interest in reducing or eliminating their use. These patients may continue to use illicit substances, attend sporadically, and fail to become stabilized. COE staff suggested that increased case management support may have limited impact on patients whose goals significantly differ from the goals of the treatment program.

Second, staff suggested that socioeconomic issues and resource scarcity may impact patient likelihood for success. Staff reported that many recent patients experience homelessness and unsafe or unstable living environments. One CRS stated that “we can only connect patients with the resources that are available, and low-cost housing is just not available.” Patients experiencing active addiction are frequently unemployed and unable to work. In conjunction with this, high levels of trauma and neighborhoods inundated by violence and poverty all impact patients’ ability to engage in treatment. Patients’ lack of basic needs, and the COE’s inability to provide them, is seen as a significant obstacle for the COE.

Lastly, it was remarked that structural issues within the treatment system impact their ability to provide effective therapeutic services. This dissertation suggested that the CRS are involved in forming a therapeutic alliance between the patient and the clinic. The structural issues identified, including the overregulation of MMT and the financial constraints placed on the clinic, may impact the ability of clients for a positive working bond. Counselors report experiencing extensive paperwork demands that hurt their ability to maintain focus the clinical appropriateness of their interventions. The level of care placement mandates of 9 hours of group therapy per week for patients in IOP was also identified as an ongoing point of contention in the clinic. Patients report that they feel unable to live productive lives outside of treatment due to the extensive requirements. While some seem to benefit from the requirements, others seemed constrained or to feel “trapped” in therapy. In this sense, the rigidity of the program requirements appears to limit the ability of clinicians to tailor treatment to the specific needs of each patient.

Whether or not we accept the contention that the therapeutic alliance formed at the initiation of treatment will significantly impact long term outcomes, these identified factors may all negatively impact the alliance formed between the clinic and its patients. For a therapeutic alliance to develop, patients must feel that the program is aligned with their best interests, committed to pursuing these goals, and prioritizing their needs (Horvath, 2001). If these are lost due to systemic conflicts described above, the CRS intervention is likely not sufficient for cultivating a sustained therapeutic alliance.

Specific Aim Two

The second specific aim of this dissertation was to identify patient characteristics that might be predictors of MMT outcomes. In accordance with this aim, this study has contributed to our understanding of the importance of patient referral method. The finding that transfer patients

outperform self-referral patients further supports the research of Sterling, Loscalzo, Rannazzisi, and Morley (2018) and their contention that traditional self-referral routes into methadone may need to be re-considered. Greater consideration of the mode of referral may help to address the problem of patient retention and engagement. Both research and clinical experience illustrate the challenge of the stabilization process (Jaremko, Sterling, & Van Bockstaele 2015). Patients often undergo intermittent withdrawal symptoms due to the slow process of dose increase as well as differences in patient methadone metabolism (Eap, Buclin, & Baumann, 2002). Patients may also undergo opioid cravings, heightened psychological distress, and negative moods (Elkader, Brands, Callaghan, & Sproule, 2009). It is possible that the services of the COE are not sufficient to address these challenges and that they are more adequately addressed through the provision of inpatient care prior to outpatient MMT.

Another explanation may have to do with time spent in treatment. While the **number of prior treatment episodes** did not correlate significantly with the outcome measures, dyadic forms of data tend to have a greater likelihood of showing significance. Additionally, patients who enter treatment from another program may have spent more time in treatment, regardless of the number of episodes. The significance of the variable of **referral method** may reflect the effect of patients who have spent consecutive time enrolled in a single treatment program. Therefore, it is possible that the effect has more to do with time spent in treatment, rather than the mode of referral. Further research can investigate this question.

Lastly, descriptive statistics on patient engagement in treatment confirmed prior research illustrating the challenge of retention and engagement in MMT. Patient attendance to therapy and medication days steadily declined throughout the 9 months, illustrating the need for additional knowledge regarding the cause of patient disengagement. The average time to stabilization of 89

days reflects the disconnect between the recommended stabilization phase of 3-4 weeks (Baxter et al., 2013) and the reality of the experiences of many MMT patients. Opioid use was lowest during months 4-6 and highest during months 7-9. Because patients in this study were identified as on average obtaining stabilization at around three months, the reduction in opioid use during months 3-6 was expected. However, the increase in opioid use during months 7-9 reflects the frequency of relapse and the challenge of sustaining progress following stabilization. Additional research is needed regarding the specific challenges that patients face following stabilization and in the later stages of treatment.

Limitations

There are several limitations to the current study. The study was not experimental, using a convenience sample of a relatively small size that may not be representative of the MMT patient population. Therefore, it is not possible to say with certainty whether the results are due to the treatment intervention, or due to other unexplained factors. The findings of this study represent a small snapshot of a much larger enterprise. The COE initiative consists of 44 additional COE care management programs throughout Pennsylvania, and therefore, these findings cannot be generalized to represent the efficacy of the entirety of the COE initiative.

Another limitation is the limited use of control variables. Illicit substance use and the presence of homelessness, for example, could both play central roles in outcomes and there are many environmental factors that this study was unable to address. The dependent variables do not include every measure of how the COE could have benefitted the patients. For example, the increase in transfer patients in the treatment group is in and of itself a positive outcome, although it was not included as a dependent variable. Additionally, the study is short in duration and does

not speak to longer term outcomes. Nine months is less than the recommended time of at least 12 months in MMT for the emergence of positive outcomes (NIDA, 2018). Indeed, due to the many challenges inherent in longitudinal research including high cost and issues of retention, there is a need for more longitudinal studies within evaluation research (Caruana, Roman, Hernández-Sánchez, & Solli, 2015).

While the treatment and control groups were not statistically different in terms of clinical variables, an insufficient number of matches was found to provide for a match case-control study. Though not significant, this illustrates that there are some differences between groups. Patient clinical and demographic data was also administered from self-report and therefore may be of mixed accuracy. Patients complete intake at the time of treatment initiation, a period of which is often characterized by great duress, including the experience of symptoms of withdrawal and psychological distress (Elkader, Brands, Callaghan, & Sproule, 2009). Lastly, the control and treatment group were impacted by the independent variable at different times, therefore leaving open the possibility of an effect of history.

Future Directions

The finding of lower opioid use among the treatment group, as well as positive trends in engagement and attendance, suggests that supportive programs such as the COE may have positive impact on patient outcomes during the early stages of MMT. The increase in referrals as a result of the COE also suggests that these program models are effective for increasing coordination of care. However, these initial findings also illustrate that gains were lost following the removal of CRS support. Whether extending the length of these programs is worth the financial cost is unclear. Larger, experimental, and longitudinal studies could help to identify

whether the positive findings regarding opioid use could extend into more long-term benefits. Greater research is needed that focuses specifically on the stabilization process and the needs of methadone patients throughout this phase. Additional studies, including qualitative methods, could increase insight into why patients withdraw or disengage from MMT, and help to elucidate the different types of supports that may be more helpful.

While positive findings were observed, the results of this evaluation illustrate a lack of long-term gains as a result COE intervention. This is an important finding, however one that may be unique to this sample in this setting. As part of a much larger enterprise, there is a wealth of data being collected that ultimately will shed light on whether this initiative is effectively increasing the number of opioid dependent individuals in care. Additionally, publication bias often results in the publication of studies that have found positive effects while neglecting to publish studies that have not. This results in a one-sided knowledge base. Awareness of the absence of an effect is important, both so that researchers do not replicate these findings and so program developers do not replicate ineffective program models. Future program developers may reconsider funding short-term supportive services within this population and treatment setting. Additionally, it is possible be the there is a threshold to be expected regarding this population's treatment outcomes and that funneling more resources into these types of programs is not the answer.

The illumination into the importance of referral source suggests a direction for future research. Larger scale studies can investigate the role of different referral source as a mitigating factor and consider alternative models for structuring MMT. For example, experimental research investigating the provision of inpatient treatment prior to outpatient MMT would be helpful. If larger scale studies could confirm the overall gains of such a method, it would help justify the

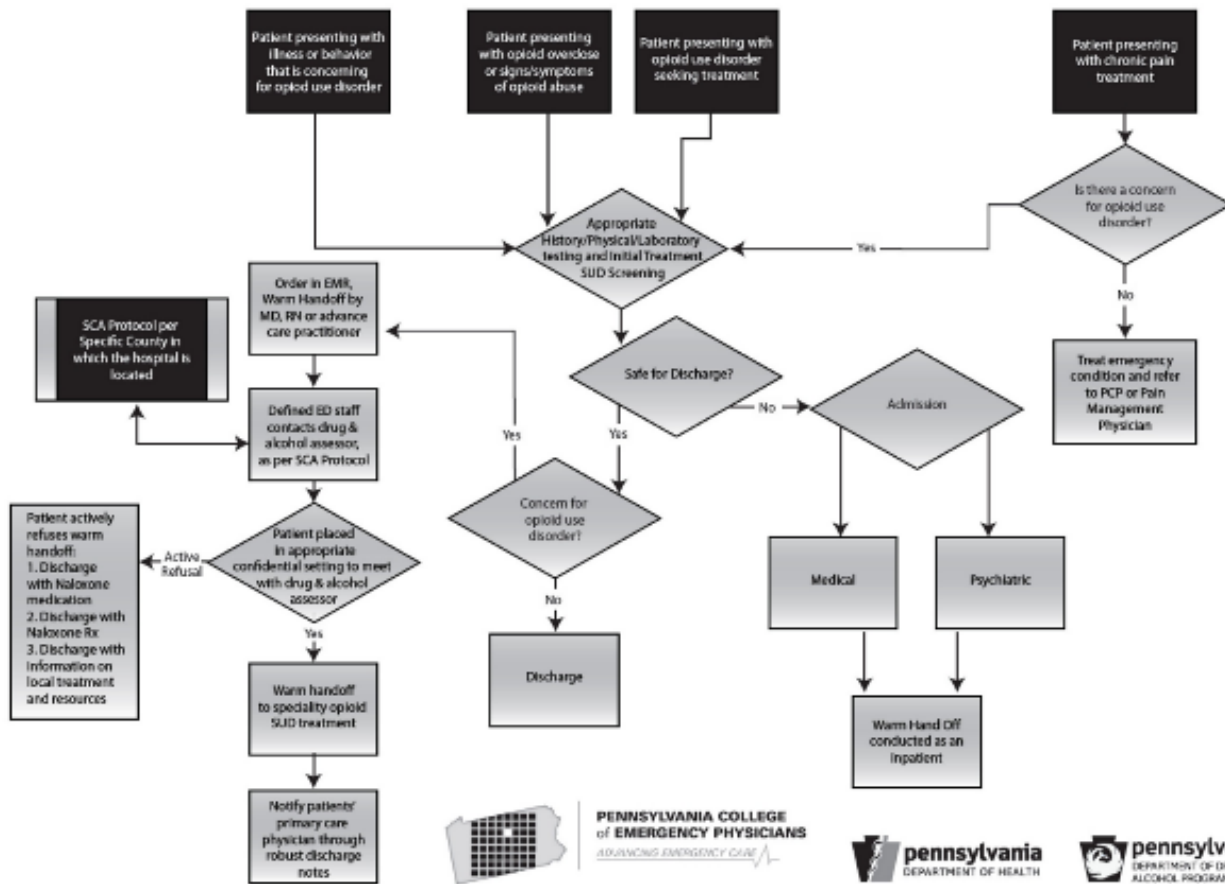
increased upfront cost of the higher level of care. If these studies confirmed this finding, one can envision a model of MMT in which all patients receive an episode of inpatient care prior to their initiation on outpatient MMT. MMT programs and inpatient rehabilitation programs should work in coordination with one another in developing an inpatient to outpatient MMT pipeline.

Other models of supportive programs and programmatic shifts should also be considered and were suggested by the clinical team at NARP. One members of the CRS team suggested that ideally the clinic would provide a more comprehensive healthcare and social services, stating that “Patients enter treatment with a variety of issues and needs. We should not focus only on addiction, but on wellness and care.” The introduction of methadone into a more conventional healthcare setting that provides greater forms of care may also help to reduce the stigma methadone patients experience. A reduction in therapy and paperwork requirements were also noted, however, this would require a significant shift in the current programmatic structure.

Finally, the findings illustrate the extreme challenge that MMT programs face. The findings of this study are not dissimilar from the majority MMT research studies which show an uneven playing field in outcomes. Some patients thrive, attend regularly, eliminate their use, and experience dramatic life improvements. Others drop out quickly or remain in treatment without progress. Opioid addiction is a powerful and devastating illness that we are only beginning to understand how to treat. It is only through continued research and program innovation that we can best learn how to beat it.

Warm Hand-off Procedures

Emergency Department Warm Handoff: For Opioid Use Disorder



PENNSYLVANIA COLLEGE of EMERGENCY PHYSICIANS
ADVANCING EMERGENCY CARE



DDAP-CHART-025 09/01/2016

Tables

Table 1: Socio-Demographic and Clinical Variables

		Control		Treatment		P
		N	% or mean	N	% or mean	
Gender						NS
	Female	27	47.40%	25	52.60%	
	Male	30	52.60%	32	56.10%	
Race						NS
	Caucasian	41	71.90%	41	71.90%	
	Black	10	17.50%	11	19.30%	
	Hispanic	6	10.50%	3	5.30%	
	Native American	0	0%	2	3.50%	
Age						NS
	18 - 30	15	26.3%	18	31.6%	
	31 - 44	26	45.7%	25	43.8%	
	45 - 65	15	26.3%	12	21.1%	
	65 +	1	1.7%	2	3.5%	
Referral Source						.001
	Self	37	69.80%	20	35.70%	
	Transfer	16	30.20%	36	64.30%	
Years Opioids Used			15.3		14.4	NS
Intravenous Drug Use						NS
	Yes	30	52.60%	41	71.90%	
	No	23	40.40%	16	28.10%	
	No Response	4	7.00%	0	0.00%	
Prior Treatment Episodes			4		5	NS
Legal History			0.71		0.85	NS
Mental Health History						NS
	Yes	31	58.50%	41	71.90%	
	No	22	41.50%	16	28.10%	

Table 2: Relationship of Condition and Outcome Indices

	r	P
Patient engagement		
Month 1	-0.19	0.04
Month 2	-0.18	0.05
Month 3	-0.22	0.02
Month 4	-0.2	0.03
Month 5	-0.11	NS
Month 6	-0.04	NS
Month 7	-0.1	NS
Month 8	-0.04	NS
Month 9	-0.21	NS
Average total therapy hours	-0.12	NS
Medication days		
Months 1-3	-0.12	NS
Months 4-6	-0.1	NS
Months 7-9	-0.06	NS
Total medication days	0.01	NS
Average dose	0.14	NS
Total milligrams of methadone	0.01	NS
Ratio of opioid negative to positive urinary drug screens		
Months 1-3	0.21	0.02
Months 4-6	-0.06	NS
Months 7-9	0.02	NS
Days to stabilization	0.04	NS

Table 3: Relationship of Referral Status and Outcome Indices

	r	P
Therapy attendance		
Month 1	0.09	NS
Month 2	0.04	NS
Month 3	-0.03	NS
Month 4	0.02	NS
Month 5	0.03	NS
Month 6	0.15	NS
Month 7	0.11	NS
Month 8	0.11	NS
Month 9	0.11	NS
Average therapy hours attended	0.08	NS
Medication days	0.07	NS
Average dose	0.27	<.01
Total Milligrams of methadone received	0.15	NS
Ratio of opioid negative to positive UDS		
Months 1-3	0.06	.03
Months 4-6	0.04	NS
Months 7-9	0.09	NS
Days to stabilization	-0.08	NS

Table 4: Descriptive Statistics of Sample Outcomes

	<i>N</i>	<i>Mean</i>	<i>Standard Variation</i>
Patient engagement			
Month 1	114	78.44	44.91
Month 2	114	58.11	48.56
Month 3	114	55.73	51.42
Month 4	114	47.03	50.62
Month 5	114	40.45	47.55
Month 6	114	31.08	44.09
Month 7	114	28.69	44.64
Month 8	114	25.23	40.63
Month 9	114	17.26	34.07
Medication days			
Months 1-3	114	66.12	28.14
Months 4-6	114	49.09	40.09
Months 7-9	114	40.36	40.36
Total medication days	113	158.13	101.78
Total milligrams of methadone	114	12362.3	10681.81
Time to Stabilization	49	89.16	72.31
Ratio of Opioid Negative to Positive Urinalysis			
Months 1-3	104	0.49	0.4
Months 4-6	76	0.6	0.38
Months 7-9	66	0.3	0.39

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