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A Crossroads in the US Opioid Epidemic: A systematic comparison of current and novel treatments reveals possibilities for systemic change

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A Crossroads in the US Opioid Epidemic: A systematic comparison of current and novel
treatments reveals possibilities for systemic change

Senior Project Submitted to
The Division of Social Studies
of Bard College

by

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Annandale-on-Hudson, New York

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Table of Contents

Abstract	5
I.Introduction	6
The Opioid Epidemic: Where it Started and Where We Are Now	6
Ii. History of Opiates	7
Iii. The Different Types of Opioids and Their Prevalence	8
Iiia. Prevalence of Fentanyl and other Synthetic Opioids	9
Iii. The Role of Purdue Pharma	10
II. Diagnosis of Opioid Use Disorder	12
Iii. Prevalence of Opioid Use Disorders in the United States	13
Iiiiii. Populations at Higher Risk	15
Iiiiiiia. Individuals with Chronic Pain	15
Iiiiiiib. Newly Released Incarcerated Individuals	16
Iiiiiiic. Homelessness and Increased Risk for Fatal Overdoses	17
III. Neurobiology and Pathology of Opioid Use Disorders	19
Iiii. Mechanisms of Action	19
Iiii. Withdrawal Symptoms Explained	20
Iiii. Short Term and Long Term Negative Physical and Psychological Effects	22
IV. Effectiveness of Current OUD Treatment	23
Iv. Current Treatment Protocols: MAT/MOUDS	24
Iv. Mechanism of Action for MAT	25
Iv. Current Psychotherapeutic Approaches for MAT	28
Iv. Cognitive Behavioral Therapy	29
Iv. Contingency Management	29
Iv. Motivational Enhancement Therapy (MET)	30
Iv. 12-Step Facilitation	31
V. Opioid Use Disorder Treatment: Comparison of Current Versus Novel Strategies	32
V. Importance of a Whole Patient Treatment Approach	32
V. Addressing the Current Treatment Gap	34
V. Factors Contributing to The Current Treatment Gap	35
V. Increasing Outcomes Dependent on Opioid Usage	38
V. Increasing Buprenorphine Administration	39
VI. Novel Strategies at Increasing Treatment Initiation	40

Vii. Novel Initiation Strategy: CATCH	40
Viii. Treatment Initiation: SHOW	42
Viiii. Increasing Access to Treatment within the Criminal Legal System	44
VII. Treatment Retention Strategies	47
Viii. Novel Retention Strategies	48
Viiii. Implementing a Harm Reduction Philosophy	50
Viiiiii. Reducing Barriers: “Treatment On Demand”	51
Viiiinii: CDC’S Response to increasing OUD Treatment Effectiveness	53
VIII: Discussion	56

Abstract

The Opioid Crisis has claimed the lives of over 1 million Americans since the 1990's. Rates of fatal opioid overdoses have risen dramatically due to the corrupted nature of Purdue Pharma and the increased prevalence of highly potent synthesized opioids. In the United States, nearly 2.5million individuals need treatment while only a fraction of them are able to receive treatment. Unfortunately, due to high dropout rates, the effectiveness of current Opioid Use Disorder treatment cannot be properly evaluated. Since the Covid-19 pandemic, states have been tackling the Opioid Crisis by implementing treatment initiation and retention strategies. These strategies aim at targeting at-risk populations and providing them with long-term patient-oriented treatment, along with implementing a harm reduction philosophy to current treatment protocols. The implementation of these public health strategies have the possibility to dramatically decrease the current treatment gap and improve the effectiveness of current Opioid Use Disorder treatment. This is a major step forward in combating the crisis.

I.Introduction

The Opioid Epidemic: Where it Started and Where We Are Now

The introduction of prescription opioids in the United States Health Care system led to opioid-related deaths to become the 4th leading cause of death in the United States. Since the late 1990's, there has been a rise in opioid misuse throughout the United States due to the corrupted nature of big Pharmaceutical companies. From 1990 to 1995, there was a drastic increase in opioid prescriptions due to the FDA approval of Oxycontin. This long-acting opioid, Oxycodone, was promoted as a non-addicting drug and was quickly administered to patients in order to control and treat their pain. There was some effort in order to implement risk management programs to accompany the increased distribution of opioids, but the efforts did not adequately manage the misuse/abuse of opioids (Bernard et al., 2018). It wasn't until 2017, almost two decades later, that the rise in opioid abuse and deaths was considered a public health crisis.

Ii. History of Opiates

Opioids have been used historically for various medical purposes but were first widely used in the United States during the Civil War to treat wounded soldiers. Morphine was the main opioid used in order to manage the pain that soldiers presented. Unfortunately, many of these

soldiers developed an addiction. Heroin was later introduced in the 1890's into the medical setting and since it was synthetically made from morphine, individuals believed that it was less habit-forming, which was quickly disproven by the increased rates of heroin abuse (Bernard et al., 2018).

Later, opioids were primarily used to treat pain in cancer patients. In the 1990's, opioids such as Oxycontin were first administered and prescribed to patients with acute or chronic pain. During this time, many medical practitioners believed that opioids shouldn't be administered in a clinical setting due to the increased risk of misuse in patients with chronic pain. The tactics of persuasion used by Purdue Pharma's marketing team led to many medical practitioners prescribing Oxycodone despite their hesitations. Medical practitioners along with many others, knew that individuals with chronic pain often dealt with mental health issues, which could increase their risk of developing a dependency if the medication was not assisted by behavioral and/or psychological therapy.

During the same period, the American Pain Society heavily marketed oxycodone and other narcotics in order to treat pain. Purdue Pharma primarily funded American Pain Society in order to increase their revenue. Within the first couple years, both prescription rates for Oxycodone increased along with ER visits due to opioid-related complications and overdoses (Hirsch, 2017). From historical observations, opioids are highly addictive drugs that need to be paired with proper surveillance and pain management therapy.

iii. The Different Types of Opioids and Their Prevalence

As previously stated, there are many types of Opioids. Opioids are derived from the opium plant and can either be natural, semi-synthetic, or fully synthetic. Natural opiates such as morphine can be transformed into codeine through man-made chemical processes. These natural opiates are mainly used in order to treat pain, often in a hospital setting. Secondly, semi-synthetic opioids such as: oxycodone, hydrocodone, hydromorphone, and oxymorphone are mainly prescribed to individuals with acute/ chronic pain. Lastly, there are synthetically made opioids such as Tramadol, Fentanyl, and Heroin, which are extremely potent compared to natural and semi-synthetic opioids. Opioids that are not regulated and distributed through illegal means bring about an increased risk of contamination with more potent opioids that increase the risk of fatal overdoses.

Opioids are currently primarily used in a medical setting to block pain signals in order to treat pain. Opioids also bring about other effects such as: sedation, euphoria, relaxation... The positive effects of opioids are the reason behind the increased misuse and abuse (Hirsch, 2017). Individuals who had become addicted to oxycodone during the first wave of the opioid crisis, soon turned to heroin due to its increased accessibility and potency. Heroin usage skyrocketed due to prescription opioid misuse, in which 80% of active heroin users previously abused oxycodone and other prescription pain medication. Without proper surveillance and other modes of pain management individuals have a heightened risk of becoming addicted and turning to other drugs that increase one's risk of overdosing.

iiia. Prevalence of Fentanyl and other Synthetic Opioids

We are currently living through the third wave of the opioid epidemic, in which fentanyl is the driving force behind the increased rates of fatal overdoses. In the past decade, there has been a drastic increase in the number of cases of overdoses relating to Fentanyl. Fentanyl is mainly used as an anesthetic within a medical setting because of its potency and effects. Compared to morphine, fentanyl is 100% more potent (*Fentanyl*, n.d.). From 2011 to 2018, according to the CDC, the rate of fatal overdoses caused by fentanyl dramatically increased. This was primarily linked to the fact that many drugs on the market were cut with fentanyl. Since fentanyl has a high potency, it doesn't take that much of the substance to produce a high which led many other drugs to be laced with it. Furthermore, fentanyl was also prescribed in order to treat chronic pain patients when oxycodone no longer worked due to tolerance. (*4 Strategies for Combating the Third Wave of the Opioid Epidemic*, n.d.).

iiiii. The Role of Purdue Pharma

Purdue Pharma invested heavily in promoting their drug, Oxycontin. They received a special FDA approval label that stated it was a non-addictive substance even though historically opioids always pose an increased risk for misuse and abuse. Sales reps were trained to persuade physicians to prescribe Oxycontin to their patients with severe/chronic pain. They additionally, used databases in order to track physicians who had high rates of patients with chronic pain. Sales reps were first ordered to go to rural areas in West Virginia, Kentucky, New Hampshire, Pennsylvania, and Ohio, where rates of chronic pain were high. In these rural areas, there were high rates of work injury due to manual labor being the main source of income. In these

communities where oxycontin was first introduced, the rate of abuse increased dramatically (Van Zee, 2009) .

Furthermore, Purdue Pharma advertised Oxycontin as a breakthrough drug that could cure pain. The techniques and forms of persuasion led many doctors to prescribe Oxycontin to their patients. From 1996 to 2001, more than 40 national pain-management conferences were held. Doctors, nurses, and pharmacists from around the country were invited to these heavily funded campaigns. From 1996 to 2000, sales grew from \$48 million to around \$1.1 billion. (Van Zee, 2009) By 2004, Oxycontin became the most misused prescription opioid in the US. (*Oxycodone: How Did We Get Here and How Do We Fix It? - BPJ 62 July 2014, n.d.*)

Additionally, the opioid epidemic came in three different waves. First, in the 1990's the implementation of opioids in a medical setting correlated with a rise in overdose deaths. As prescription opioids became harder to find/purchase, rates of heroin usage went up. Later, in 2013, synthetic opioids were readily available and were often illicitly manufactured. In the third decade of the Opioid Epidemic, the increased prevalence of Fentanyl is the leading cause of opioid related overdoses. The forms of persuasion and unethical practices on the part of Purdue Pharma is the reason why there is an opioid crisis and that opioid -related deaths reached a record high in 2021, in which 100,000 individuals died (*Understanding the Epidemic | CDC's Response to the Opioid Overdose Epidemic | CDC, 2021*).

Over the past three decades, the United States has seen a stark rise in fatalities linked to the overprescription of opioids, along with the usage of heroin and other synthetically made opioids. As doctors across the US prescribed oxycodone and other pain killers, patients quickly developed a dependency on them. Cases of Opioid Use Disorders increased, leaving millions of

individuals to continue using prescription opioids and later using heroin as a cheaper means of getting high. Opioid Use Disorders (OUD) are very complex disorders that cannot be fixed without proper treatment due to the underlying neurobiological and physical changes that are present in chronic users. Opioid Use Disorders are linked to a drastic decrease in quality of life, social relations, job performance, and increased illegal behavior. Additionally, OUD does not discriminate based on age, sex, and/or race. There are of course certain risk factors that increase one's risk, though anyone who has been prescribed oxycodone is at risk of developing an addiction due to its highly reinforcing properties.

II. Diagnosis of Opioid Use Disorder

As previously mentioned, Opioid Use Disorders stem from the misuse and abuse of opioids. Opioid use disorders are one of the most challenging mental health disorders to treat. In the United States alone, over 2 million individuals are diagnosed with OUD each year. Within this population, 120,000 deaths occur due to opioid-related overdoses. The misuse and abuse of opioids is linked to physiological and behavioral dependencies of the drug (Hirsch, 2017).¹

Opioid Use Disorder is characterized by chronic misuse/ abuse of opioids with the presence of withdrawal symptoms. During the first wave of the opioid epidemic, opioids were primarily ingested orally. During the second and third wave of the opioid epidemic, opioids were often intravenously injected or administered intranasally (e.g. heroin and fentanyl). As the rates of prescribing Oxycontin increased, more and more individuals began abusing the drug. The long-acting Oxyconton was promoted as a non-addictive drug because of the delayed onset

¹ For the diagnosis criteria see appendix p.60

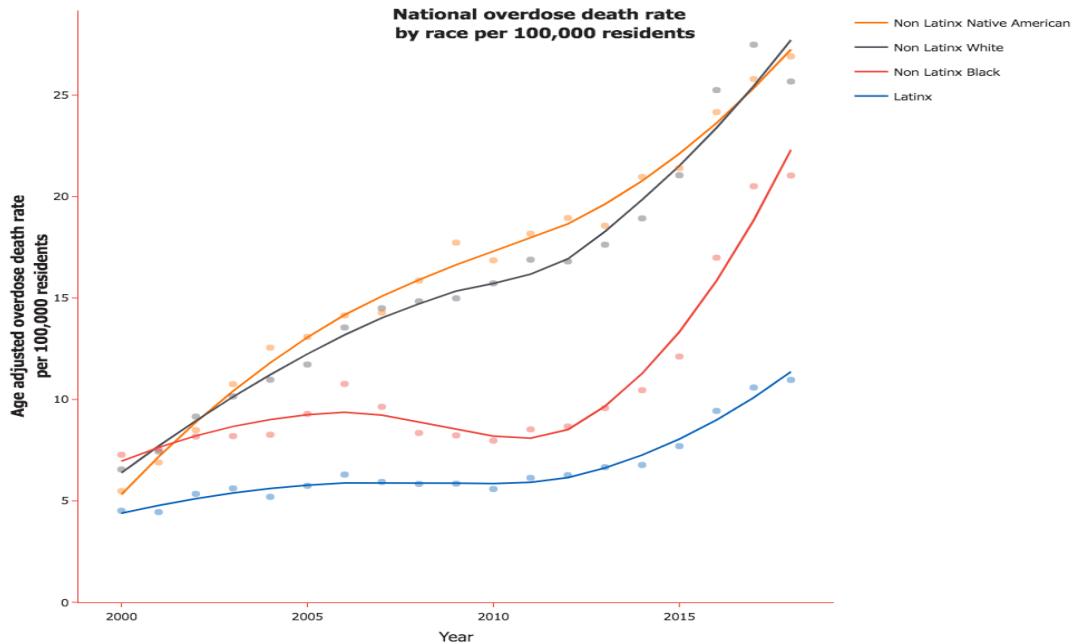
and duration of the effects. Oxycontin was said to be slowly released into the body over a period of 12hrs in order to reduce one's pain throughout the day. Though as individuals' tolerances grew, there was a diminished effect of the drug. Soon individuals started to crush and snort Oxycontin in order for the onset of the effects to take place faster. Depending on the different routes of administration, the onset, duration, and effects of the drugs differ along with the increased risk of physical and psychological dependencies (Kosten & George, 2002).

When an individual repeatedly takes a narcotic, they develop a tolerance. Meaning, that in order for the effects of the opioids to occur one has to increase the dosage. When one develops a tolerance, withdrawal symptoms will most likely occur. As the body and brain adapt to repeated drug usage, it becomes dependent on the presence of said drug. Meaning that, repeated exposure to escalating doses of opioids alters the brain so that it functions more or less normally when the drugs are present and abnormally when they are not. Withdrawal symptoms are often not deadly but pose a major physical and psychological toll on the individual (*Opiate and Opioid Withdrawal*, 2021).

III. Prevalence of Opioid Use Disorders in the United States

In the United States, we have seen a rise in Opioid Use Disorders since the 1990s. As different opioids became more available, so did the prevalence of increased opioid abuse. In 2017, around 1.7 million people in the United States suffered from prescription pain reliever substance abuse disorders. Additionally, nearly 600,000 people in the United States suffer from heroin use disorder. The rise in synthetic opioid usage has been correlated to a stark rise in

fatalities. Moreover, a demographic study analyzed the rise in overdose deaths among individuals dependent on race (see figure 1). Understanding the trends is important to better assessing which populations have been most affected by the current opioid epidemic.



(Fig 1) The figure above shows the rate of overdose deaths based on race. The highest rates of overdose deaths during that past 18 years are present among Native Americans and white individuals. From 2013 to 2018, there has been a 120 percent increase in overdose rates among Black American (9.58 and 21.04 per 100,000 from 2013 to 2018) (*Overdose Deaths and Jail Incarceration - National Trends and Racial...*, n.d.).

Understanding the scope of the Opioid Epidemic and the various trends seen throughout it is important in creating equitable public policy changes. America’s War on Drugs has

perpetuated the discriminatory practices seen within the Criminal Justice System. Moreover, even within the healthcare setting there is still stigma surrounding substance abuse disorders, which further perpetuates the continued cycle of opioid abuse. Understanding the scope of the epidemic is crucial in understanding which populations are most at risk in order to create public health policies that not only target at-risk populations but ensure that more treatment becomes accessible.

IIiii. Populations at Higher Risk

IIiiia. Individuals with Chronic Pain

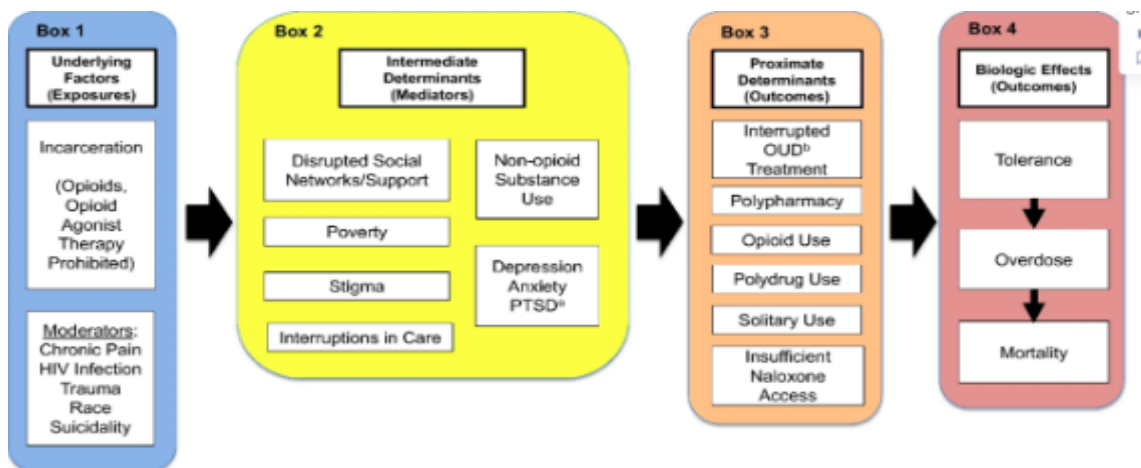
Opioid Use Disorders don't discriminate based on gender, race, and/or age, though there are some risk factors that increase one's risk of developing an addiction. Major pharmaceutical companies like Purdue Pharma first targeted at-risk populations because of their ability to increase profit. Within these populations, there was often no associated care given in order to observe the patient's medical and psychological needs. Chronic pain, psychological distress, financial burdens, poor social/familial support, and many other factors are not accounted for when individuals are prescribed narcotics such as Oxycodone.

Individuals who suffer from chronic pain are at a higher risk of developing an addiction. A systematic review conducted by Vowels et al., 2015 found that between 21%-29% of patients with chronic pain that were treated with opioids misused them. Furthermore, from that 21% to 29%, on average 8-12% of patients developed an addiction. Individuals with chronic pain often

present with comorbid physical and psychiatric disorders, which accounts for the heightened risk of developing an addiction (Vowles et al., 2015).

IIIib. Newly Released Incarcerated Individuals

Moreover, individuals who are released from prison are at a much higher risk of overdosing due to past substance abuse disorders and lowered tolerances. Due to the lack of treatment for individuals within this criminal justice system and stigma surrounding addiction, rates of preventable fatal overdoses are heightened once inmates are released (fig.2).



(Fig. 2) (A Conceptual Model for Understanding Post-Release Opioid-Related Overdose Risk | *Addiction Science & Clinical Practice* | Full Text, n.d.) The figure above analyzes the numerous risk factors that are associated with an increased risk of overdosing for newly released inmates. Within the correctional facilities, Opioid Agonist Treatment (MAT) is often prohibited which contributes to increases barriers in accessing effective treatment and leads to stigma and lack of harm reduction resources. Without treatment individuals who've been abusing opioids or other substances when released will have a diminished tolerance. Due to neuropsychological effects associated with Opioid Usage, individuals will often continue to abuse opioids and other substances when released and due to diminished tolerances individuals have a heightened risk of fatally overdosing.

Organizations that have been tracking the Opioid Epidemic and its various trends have addressed the issues present within the criminal justice system. The Substance Abuse and Mental Health Services Administration (SAMHSA) is a branch of the U.S Department of Health and Human Services. This organization has been tracking various trends relating to substance abuse and mental health disorders in order to integrate data into public policy making. A report by SAMHSA found that individuals who are recently released from prison and who have had a history of opioid abuse are 10 to 40 times more likely to die from a fatal overdose. Furthermore around 16% of deaths among newly released incarcerated individuals are due to fatal overdoses; 30% are due to suicide and 26% are due to heart disease. These stark statistics encapsulate the failures within the criminal justice system to provide adequate mental and physical rehabilitation.

IIiic. Homelessness and Increased Risk for Fatal Overdoses

Furthermore, individuals on the brink of homelessness or who are homeless and are suffering from Opioid Use Disorders are at a higher risk of dying from opioid overdoses. A study conducted by Yamamoto et al, compared opioid related outcomes between homeless individuals and low income housed individuals. Homelessness brings many factors that increase one's risk of opioid related complications and death including: poor familial support, physical/psychological burdens, environmental factors,.... From the study, they found that 1 in 10 homeless individuals who are admitted to the emergency department have an opioid related disorder. Additionally, they found that individuals who are homeless are at a much higher risk of opioid overdose and ED admission compared to individuals who are housed (1.8% versus .3% and 10.4% versus 1.5% respectively) (Yamamoto, 2019). This high rate of OUD among homeless populations may be correlated with increased drug usage due to physical/psychological

burdens and the increased prevalence of laced drugs that are more accessible. It may also be the fact that chronic opioid users may become homeless due to economic and social factors that become present.

Furthermore, individuals who are homeless are less likely to receive treatment due to the inability to access proper treatment and stigma surrounding homelessness and drug usage. Due to the fact that current protocols within the ED settings do not decrease the risk of opioid deaths, many patients are often repeatedly admitted to the hospital. Repeated hospital admissions and inpatient treatment is costly for hospitals and will continue to be so until proper treatment can become more accessible for populations most at risk. Increasing access to care for individuals who are homeless is an imperative step in creating equitable public policies in order to decrease the rate of fatal overdoses.

Purdue Pharma is just one example of the systematic discrimination and unethical practices seen within major pharmaceutical and medical industries. Their immoral tactics have led millions of individuals to become addicted to opioids. Furthermore, they are the reason behind the economic impact of opioid use disorders in the United States, in which in 2017, alone 1,021 billion dollars have been spent on care for Opioid Use Disorders and opioid-related fatalities (Luo, 2021). Populations at a higher risk of overdosing: newly released incarcerated individuals, homeless individuals, and individuals with chronic pain have often been stigmatized within the healthcare systems. It is equally important that multiple systems such as the criminal justice system, public health care systems, and educational systems are able to provide education surrounding OUD in order to increase awareness and reduce stigma around those who are

suffering. Furthermore, increasing accessibility to MAT treatment and harm reduction resources to populations most at risk is essential in tackling this epidemic.

III. Neurobiology and Pathology of Opioid Use Disorders

IIIi. Mechanisms of Action

Depending on the route of administration, the effects of the opioid/opiate may differ in terms of its severity of effects and duration. At the same time, all opioids bind to particular receptors in the brain and act out a series of steps that allow for the effects to take place. Opioids, when administered, travel throughout the bloodstream to the brain. Opioids then bind to opioid receptors in order to block pain signals and increase reward processes. When opioids activate these reward processes, it triggers feelings of euphoria, which acts as a positive reinforcer (Kosten & George, 2002). Due to the positive reinforcing properties of opioids, individuals tend to continue using. Furthermore, the presence of withdrawal symptoms occurs due to repeated exposure to escalating doses of opioids which alters the brain so that it functions abnormally when opioids are not present (*Opiate and Opioid Withdrawal*, 2021)

The reward system is part of the major brain functions that are altered due to chronic usage of opioids. The most common opioids are agonists meaning that they activate the receptors that they bind to. These receptors are called *mu* opioid receptors. When attached, the effects of the opioids take place (e.g. feelings of euphoria, pain reduction...) (Trescot et al., 2008). As opioids bind to opioid receptors it releases high levels of dopamine (DA) into the nucleus

accumbens (NAc) (**fig. 3**). The Ventral Striatum is in charge of the release of DA into the NAc causing feelings of pleasure. Other areas of the brain create a lasting record or memory that associates these good feelings with the circumstances and environment in which they occur. The NAc conditions the individual to associate opioids with positive/good feelings, which in return is the beginning of a psychological dependence to opioids (Kosten & George, 2002).

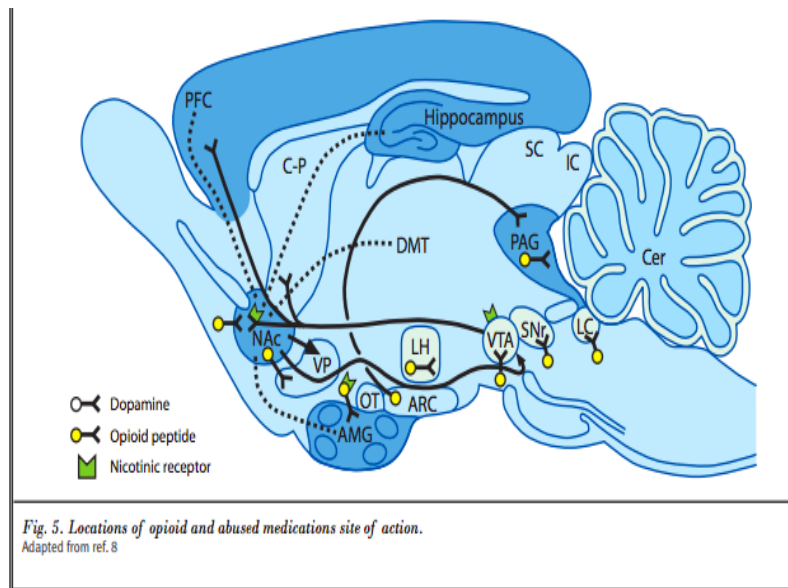


Fig.3. The figure above shows the neurological pathways associated with opioid usage. The release of dopamine into the NAc is associated with positive effects such as feelings of pleasure, decreased pain signals, and euphoria. The figure also highlights other regions of the brain that are associated with opioid usage (Trescot et al., 2008).

IIIii. Withdrawal Symptoms Explained

As previously mentioned, continued abuse of opioids dramatically decreases the effects of the reward system. Due to a diminished response to pleasurable feelings, the individual will

have to take a higher dose in order for the effects of the opioid to take place. Another key player in the effects of opioids on the brain is the Locus Coeruleus. The Locus Coeruleus's main role is to release noradrenaline. Noradrenaline (NA) is a neurotransmitter that is involved in alertness, vigilance, sleep, mood, and blood pressure. Normally, natural opioids that are produced in the brain bind to the opioid receptor, which activates the conversion of adenosine triphosphate (ATP) into cyclic adenosine monophosphate (cAMP). Cyclic adenosine monophosphate (cAMP) then triggers the release of NA. When opioids bind to the *mu* opioid receptors, it diminishes the function of the locus coeruleus, meaning that it inhibits the release of NA. As the user continues to take opioids, the Locus Coeruleus will adapt to the brain function changes by increasing the production of noradrenaline in order to cancel out the initial null effect. In the absence of opioids in a chronic opioid abuser, the effects of increased amounts of noradrenaline create withdrawal symptoms. Withdrawal symptoms are characterized by feelings of anxiety, headaches, chills, fevers... Moreover, the presence of withdrawal symptoms from a clinical standpoint is the main driving force behind repeated abuse of common opioids (Kosten & George, 2002).

The neurobiological changes that occur among chronic opioid users are important at understanding the complexity of the disorder. When an individual develops a tolerance to their drug of choice, their body has become dependent on the drug and without it, it cannot carry out normal functions. Due to the neurological changes that occur, individuals cannot recover on their own and need proper effective treatment in order to safely withdraw and recover. Furthermore, the neurobiological changes that occur have a direct impact on one's physical state, in which the majority of individuals with OUD present with comorbid mental and/or physical health issues.

IIIiii. Short Term and Long Term Negative Physical and Psychological Effects

Administering and abusing opioids can lead to numerous short and long term physical and psychological effects. Around 45%-90% of users develop digestive issues such as constipation and vomiting. The second most common physical effect is hypoxia, which occurs due to the lack of oxygen distribution to the brain, and can lead to permanent brain damage among other severe side effects such as coma and/or death. These short term physical effects can lead to other complications that put an individual at an increased risk of serious illness.

Chronic opioid use is also associated with long term effects that are irreversible without proper management and treatment. Endocarditis is one of the most common long term effects. Infection endocarditis is an infection of the heart and is often present among heroin users. It has been estimated that 20% of individuals who develop this infection will die. Additionally, blood borne infections due to shared needle usage put individuals at risk for developing Hepatitis C, HIV, and other diseases. Individuals who have developed an OUD are ten times more likely to develop comorbid psychiatric disorders such as depression and/or anxiety along with other comorbid addictions (*Opioid Side Effects On The Brain & Body* | *The Hope House*, 2020). Co-occurring disorders are often linked to chronic usage of opioids and are needed to be treated in order for the individual to properly recover and regain their life.

Lastly, opioid-related overdoses are very prevalent among chronic opioid abusers and are responsible for the majority of opioid related fatalities. When an individual administers a higher dosage of opioids than normal, it leads to respiratory depression. Opioids inhibit the necessary activation of the medulla oblongata, which is in charge of normal respiration. Due to the

inhibition of this region, individuals will present signs of severe respiratory depression along with other symptoms such as: confusion, unconsciousness, pinpoint pupils, lack of motor response... Without immediate medical attention, individuals have a high risk of mortality (*Opioid Overdose*, n.d.).

Due to the underlying brain changes present in individuals with OUD, treatment for opioid use disorders tends to be complex and long-term. As previously mentioned, withdrawal symptoms that are present after an individual develops a tolerance are the main driving force behind continued opioid usage. Current treatment protocol targets the presence of withdrawal symptoms by diminishing their negative effects in order for individuals to detox from their current drug of choice. Cravings are also linked to repeated usage of common opioids, in which behavioral therapy and medication can decrease the intensity of cravings and environmental triggers. Current treatment protocols for OUD have been shown to be effective though, due to lack of treatment initiation and low retention rates current treatment protocols are not as effective as they need to be.

IV. Effectiveness of Current OUD Treatment

Treatment for Opioid Use Disorders is extremely complex due to the underlying factors that differ from one individual to the next. Chronic opioid abuse leads to brain changes that are difficult to repair without proper long term treatment. On the frontlines of treatment, Medication Assisted Therapy (MAT) has been the most beneficial treatment for individuals with Opioid Use Disorders. MAT has long been the main treatment protocol for Opioid Use Disorders and uses medication in conjunction with behavioral therapy in order to treat the individual. Another

treatment for Opioid Use Disorder is MOUDS (medication for opioid use disorders) which provides medication in order for the individual to detox. The length of treatment differs per individual, but it is recommended that individuals receive treatment for at least 12 months.

Due to the length of treatment and the difficulties that individuals face during treatment, there are high rates of treatment drop-out. According to a meta-analysis conducted by Sofuolgu et al, they found that during the initial treatment induction phase, up to 40% of individuals dropped out. Furthermore, after three months of treatment, the dropout rate goes up to 60%. When examining effective treatment protocols, retention rates are crucial in evaluating the efficacy of treatment. Retention is defined by compliance to treatment for a length of time that is deemed suitable for the individual to regain their social, recreational, physical abilities... With low rates of treatment retention, the benefits of treatment cannot be evaluated correctly. As the current opioid crisis continues to make headlines, it is crucial that current treatment protocols for Opioid Use Disorders should focus on increasing initiation and retention rates by providing accessible pharmacotherapeutic and behavioral treatment (Sofuoglu et al., 2019).

IVi. Current Treatment Protocols: MAT/MOUDS

There are currently three pharmacological treatments for MAT/MOUDs approved by the FDA to treat OUD: Methadone, Buprinephrone, and Naltrexone. Suboxone is also currently used and is the combination of both Buprinephrone and Naltrexone. These medications are used in conjunction with behavioral therapy in order for individuals to safely withdraw from the drug they had been abusing along with developing and learning strategies to combat the underlying factors that were at play during their addiction. The most common forms of behavioral therapy

that are used in conjunction with medication are: contingency management, cognitive behavioral therapy, support groups, and one-on-one therapy sessions. These modes of behavioral therapy aid at increasing social functioning and retention.

IVii. Mechanism of Action for MAT

Firstly, Methadone is a synthetic full opioid agonist that binds to the mu-opioid receptors. When it binds to the mu-receptor, it inhibits the presence of opioid withdrawal symptoms and cravings. At the same time, the release of methadone in the bloodstream occurs much more slowly than heroin or other opioids. The slowed release inhibits the onset of positive effects of other opioids, though negative and positive side effects may be present within the induction phase of methadone treatment (Connery, 2015).

Secondly, Buprenorphine is a partial opioid agonist with a high binding affinity and a long duration of action. The majority of OUD cases can be managed with Buprenorphine. Though it is most effective when individuals present mild/moderate withdrawal symptoms. Buprenorphine binds to the *mu* opioid receptors but only partially activates with effects of the binding. Buprenorphine's effects are milder than the effects of methadone. Furthermore, Buprenorphine can be administered by one's physician, which increases treatment initiation. While Methadone can only be administered in specific clinics (see annex p.61_). From a public policy standpoint, the administration of Buprenorphine should be the first line in treatment because of its favorable safety margin (Carley & Oesterle, 2021).

Thirdly, there is naltrexone, which is an opioid antagonist. Opioid Antagonists inhibit the function of the *mu* receptor in order for cravings to diminish. The issue that arises with naltrexone is that one has to be completely detoxed in order to start treatment. Meanwhile, Methadone and buprenorphine can be administered while the individual has not detoxed. Additionally, Naltrexone does not produce a physiologic dependence that can be observed in individuals treated with Methadone or Buprenorphine (Carley et al.,2021). Unfortunately, naltrexone treatment is correlated with high dropout rates due to severe withdrawal symptoms being present while being administered Naltrexone.

Lastly, we have Suboxone, which is the combination of Buprenorphine and Naltrexone. Since the early 2000's, there has been a rise in Suboxone clinics in order to treat OUD. The combination of both FDA- approved drugs creates an opioid antagonist that manages cravings and reduces symptoms of withdrawal. Furthermore, Suboxone treatment has been associated with a decreased risk of dependency compared to methadone treatment (*What Is Suboxone? 4 Facts Every Patient Should Know - Recovery Care, 2022*).

Individuals with chronic OUD are at higher risk of developing physical and other mental comorbidities. Individuals cannot recover on their own, meaning that long term patient- oriented treatment is imperative. Additionally, treatment needs to consist of both medication (methadone, buprenorphine, naltrexone, or suboxone) paired with more than one psychotherapeutic approach in order for treatment to be effective long term.

As previously stated, current MAT treatment is effective at reducing opioid- related fatalities and reducing drug usage, though there are many barriers that limit its accessibility and

potential benefits (**fig. 4**). In a systematic review conducted by Hser et al, they analyzed whether different MAT medications were more effective at retaining individuals in treatment. They concluded that individuals randomized to the Buprenorphine (BUP) group had lower retention rates compared to the Methadone (MET) group, though results were not statistically significant. The varying retention rates were mainly due to the fact that in the Methadone treatment group individuals had access to other health care and behavioral therapy support compared to the Buprenorphine group. From this, treatment retention is influenced by the services provided in treatment that aid in increasing motivation and compliance. At the same time, depending on the severity of one's disorder, different medications may be more beneficial. Due to Methadone's agonist properties, its effects are more favorable to certain individuals compared to others (Hser et al., 2016). Due to the multiple factors that are associated with OUDs treatment, medication alone does not increase retention and thus it needs to be in conjunction with behavioral therapy and other health care services to increase its effectiveness.

Buprenorphine, Methadone, and Suboxone are the most commonly used medications in MAT; their effectiveness depends mainly on individuals motivation and ability to complete treatment. Methadone has been the golden standard for OUD treatment, though there are many barriers that limit its accessibility. Buprenorphine, on the other hand, is able to become more accessible because it can be prescribed by medical practitioners. Compared to Methadone, which can only be administered in licensed MAT/MOUDS treatment centers. Additionally, suboxone has also been shown to be an effective medication in combination with behavioral therapy.

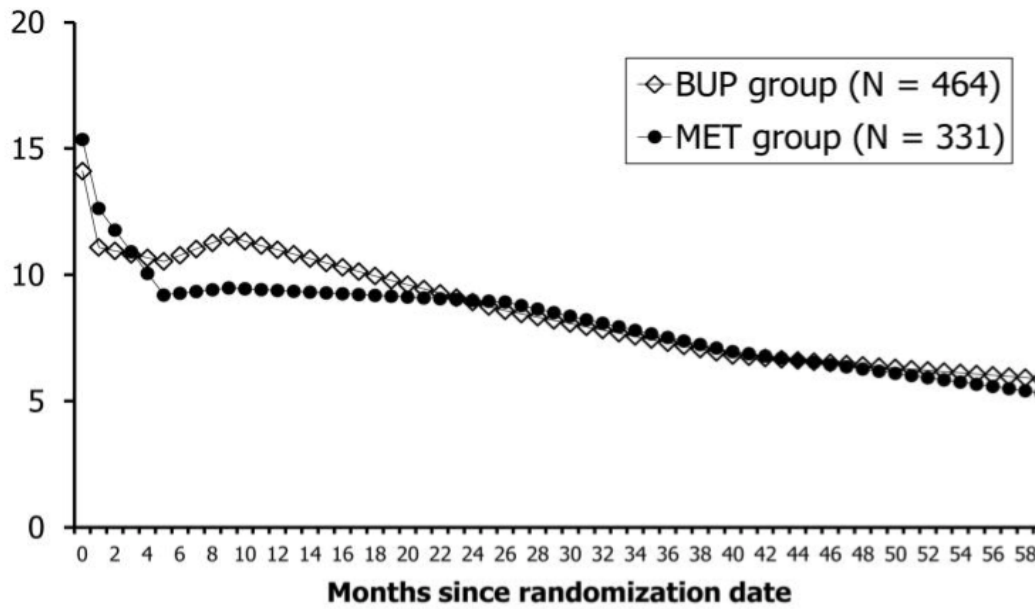


Fig.4. This figure shows that opioid use per month decreased in both randomized groups. Participants who were in the Methadone group had fewer days of opioid use compared to the BUP group. At the same time, both groups had a statistically significant decrease in opioid usage over the course of treatment and post-treatment.

(Hser et al., 2016)

IViii. Current Psychotherapeutic Approaches for MAT

Substance Abuse Disorders such as OUD are complex disorders with overlapping psychiatric, social, and legal problems. Behavioral therapy in conjunction with an FDA approved medication has been shown to increase retention and effectiveness of treatment. As previously stated, OUD's may stem from certain risk factors such as poor familial support, trauma, abuse... in which behavioral therapy addresses these issues in order to treat the "whole" individual.

Evidence-based behavioral therapies have been shown to be effective at addressing underlying problems and rewiring reward pathways.

Current behavioral therapies include: contingency management (CM), cognitive behavioral therapy (CBT), motivational enhancement therapy (MET), and 12-step facilitation. Furthermore, peer/community support via peer support meetings and therapeutic housing has also been shown to be effective at reducing relapse rates. Medication alone has been shown to not be an effective treatment measure due to the presence of comorbidities and heightened cravings due to environmental triggers.

IViia. Cognitive Behavioral Therapy

Cognitive Behavioral Therapy combined with medication has been shown to be effective for individuals who have underlying psychiatric/health/social problems including: chronic pain, anxiety, and depression. The main aspects of CBT is to provide education on the negative effects of chronic opioid usage along with providing tools in order for individuals to reduce their cravings and reactions to certain environmental triggers. CBT provides proper problem solving and coping skills in order for the individual to be able to carry out “normal” social tasks. CBT is often provided to individuals one-on one with a therapist, but it can also be used in a group setting (*Opioid Use Disorder | Fact Sheet, 2021*).

IViib. Contingency Management

Another evidence based effective behavioral therapy is contingency management. Contingency Management (CM) uses operant conditioning in order to retrain individuals'

reward pathways. When individuals come into a clinic, they are often screened for drug usage. If an individual has a negative drug screening, they are rewarded with either a cash incentive or some form of material good. Contingency management is a cost-effective behavioral therapy approach. According to an investigation by Fairley et al., they found that MAT accompanied by both contingency management and overdose education was both cost and time effective. It has been estimated that in a cohort of 100,000 patients, without treatment there would be 42,717 overdoses and among them around 12,600 fatalities. Administration of Methadone was the most effective form of medical treatment in reducing overdose rates. Followed by buprenorphine and naltrexone. When accompanied by contingency management and overdose education, it resulted in the highest rate of overdose reduction, though more research needs to be done in order to access other treatment protocols (Fairley et al., 2021).

IViiiic. Motivational Enhancement Therapy (MET)

Thirdly, Motivation Enhancement Therapy (MET) has been shown to be an effective behavioral therapy that increases retention rates. Motivational Enhancement Therapy (MET) is a counseling approach to increase one's motivation to continue treatment. It is often used with individuals who are ambivalent/ reluctant to treatment. MET occurs via meetings with a therapist, in which the individual will learn proper coping mechanisms and reasons to quit their drug of choice. Throughout the sessions, individuals are monitored in order to evaluate their treatment response and motivation to continue receiving treatment. MET has been shown to increase retention rates which in return would reduce drug usage and overdoses (Abuse, 2016). In a study conducted by Dieperink et al., found that MET improved retention and abstinence rates among individuals with Alcohol Use Disorder. From this randomized control trial, they

found that abstinence rates increased in the experimental group (35% at baseline and 73% at 6-month follow up). Compared to the control group, abstinence rates increased only slightly (35% at baseline and 59.5% at 6-month follow up). Considering that this study wasn't analyzing individuals with OUD disorders, it is still unclear what the efficacy of MET would be on abstinence and retention rates (Dieperink et al., 2014).

IViiiid. 12-Step Facilitation

Many substance abuse disorders are treated by a 12-step facilitation program in order to increase compliance and motivation to change. Individuals undergo a series of steps in order for them to be able to continue treatment and remain in treatment. The first step is acceptance of the fact that one has a disorder. Secondly, due to chronic drug use and the neurological changes that occur one has to seek medical and psychological support in order to recover. Alcoholism is the main substance abuse disorder that incorporates the 12-step facilitation program. There needs to be more research in order to evaluate the effectiveness of this behavioral therapy in conjunction with medication for OUD (Abuse, 2020).

Medication alone for Opioid Use Disorder treatment has been shown to not be effective. Medication needs to be paired with one or more forms of behavioral therapy in order to treat all the factors that may be associated or impacted due to addiction. Furthermore, these behavioral therapies aid at rewiring the reward processes in order for one to not depend on the drug they had been abusing. Additionally, by increasing compliance and motivation through Motivational Enhancement Therapy and Contingency Management retention rates may increase, which would in return reduce the rate of relapse and fatal overdoses.

V. Opioid Use Disorder Treatment: Comparison of Current Versus Novel Strategies

Vi. Importance of a Whole Patient Treatment Approach

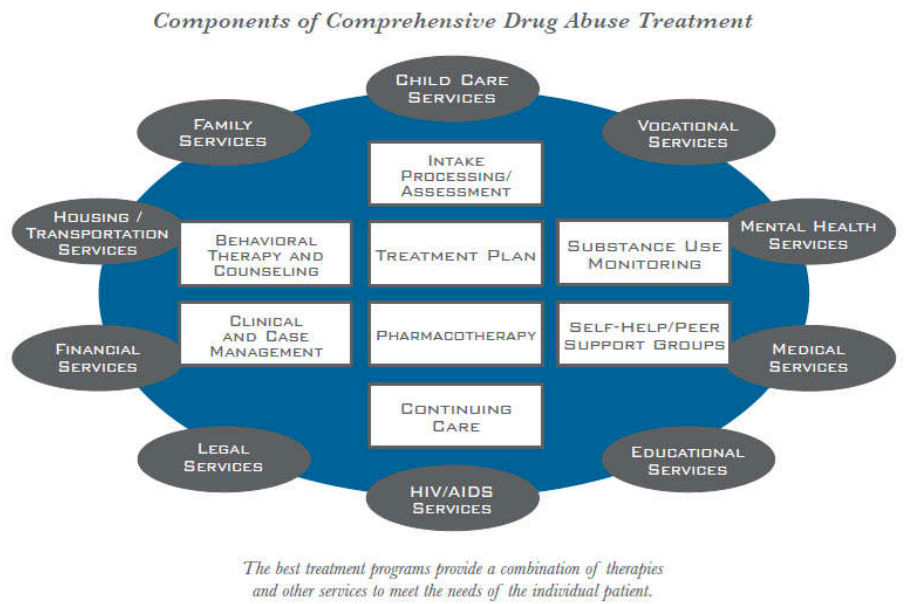


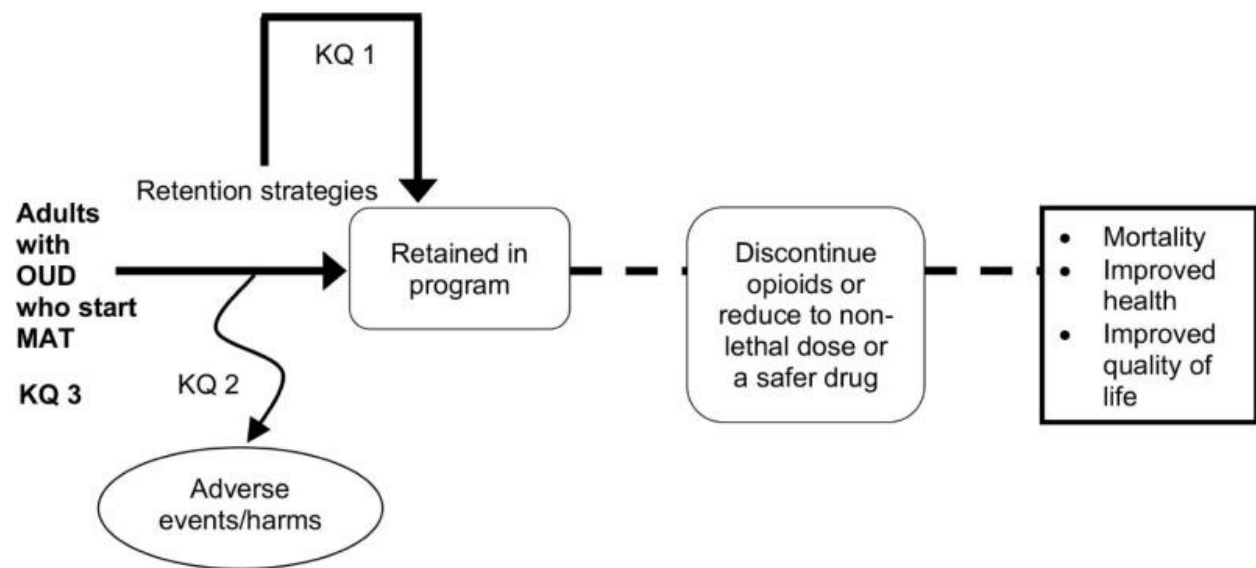
Fig.5 (“Whole Person” Approach Needed to Solve Opioid Epidemic, Says APA, n.d.)

The figure above shows the various components of drug abuse treatment. Within the principal framework of treatment, assessing and creating a treatment plan for the individual should include multiple health, social, and mental health treatment options that would best suit the individual’s needs.

When it comes to providing long- term effective treatment for individuals with OUD, it is imperative that treatment is individualized in order to meet the needs of the patients. It has been shown that individuals who remain in treatment over an extended amount of time report decreased criminal activity, improved social/psychological functioning, and stop drug usage (**fig.6**). Compliance to treatment is increased when an individual is treated by a “whole patient approach”. A whole patient approach is characterized by accessing the multiple factors that are

associated with one’s OUD along with resources to aid the individual in accessing and retaining in treatment.

Furthermore, the American Psychological Association has stated that the most effective treatment involves both pharmaceutical and psychotherapeutic treatment. Behavioral therapies such as contingency management, cognitive behavioral therapy, and multidimensional family therapy are the most effective forms of therapy. Concluding that treatment initiation and retention strategies for opioid use disorders needs to revolve around effective pharmaceutical and psychotherapeutic approaches in order to treat “the whole individual” (*“Whole Person” Approach Needed to Solve Opioid Epidemic, Says APA, n.d.*).



(Fig.6) The study conducted by Chan et al, found that participants with OUDs who remained in treatment reported an increase in quality of life, improved health, and reduced mortality. (Chan et al., 2021)

Vii. Addressing the Current Treatment Gap

Opioid Use Disorders are the most deadly mental health disorders. On average, 100 individuals die from opioid- related overdoses daily. Among them the majority of them were chronic opioid users. Additionally, OUDs are correlated with negative social/psychological problems, poor health, increased risk of death/serious illness etc... As rates of OUD continue to rise it is important to analyze the effectiveness of current treatment in order to evaluate the changes that need to be made in order to increase initiation and retention rates.

Current treatment for Opioid Use Disorders has been shown to decrease fatalities, though the main issue at hand is the current treatment gap and low retention rates. A study conducted by Amura et al., found that death rates among individuals in MAT treatment are 75% lower than those who had left treatment. Furthermore, in the US alone, 2.5 million individuals are in need of treatment, in which they either do not admit themselves or do not have access. Additionally, individuals who are admitted to treatment with lack of motivation are at a higher risk of relapsing which can lead to an increased risk of death.

Treatment for Opioid Use Disorders need to implement different strategies in order to increase treatment initiation and motivation enhancement in order for retention rates to increase. As States are receiving more money in order to combat this pressing public health crisis, it is important that effective policies are implemented (Amura et al., 2022).

Viia. Factors Contributing to The Current Treatment Gap

Understanding individuals needs and past opioid usage is important in assessing treatment options that would correlate with increasing retention rates. Furthermore, it is imperative that current treatment should become more accessible in order to narrow the current treatment gap.

The current treatment gap has been caused by numerous factors. For one, there aren't enough treatment centers in order to treat millions of individuals with OUD. In a study conducted in 2017, almost 70% of individuals with OUD did not receive treatment. On top of that, depending on an individual's consumption and severity of their addiction, different MAT medication should be used in order to meet the needs of the individual. Unfortunately, the majority of the clinics that administer MOUDS/MAT treatment only offer one type of medication. Moreover, only 32% of clinics in the United States administer all medications. Considering that individuals respond differently to medication dependent on their past drug usage and other variables, there should be more than one option for medication. There are fewer than 1700 methadone clinics, in which only 380,000 individuals are able to be treated. Meanwhile, 2.5 million individuals are in need of treatment. As previously stated, Methadone has been shown to be more favorable in treating Opioid Use Disorder and has been linked to increasing treatment retention (Donroe & Tetrault, 2018). At the same time, more research needs to be done in order to fully assess the effectiveness of different medications on different types of individuals. Unfortunately, mainly due to access barriers, administration of methadone is limited and does pose a safety concern due to increased risk of respiratory depression and other negative side effects.

Buprenorphine on the other hand, has a much favorable safety margin and can be administered by certified health practitioners. Buprenorphine has also been an effective mode of treatment for individuals with chronic pain and individuals who haven't responded positively to methadone. Buprenorphine administration could be a lot more accessible because primary care doctors and other medical practitioners have the ability to become certified in order to provide care for their patients. Unfortunately, it has been estimated that only 13% of clinicians are certified to prescribe Buprenorphine. This is mainly due to insufficient training in assessment and treatment of Opioid Use Disorders along with stigma surrounding individuals with OUD. Additionally, due to lack of knowledge and other barriers such as restrictions on the part of the organization that provides waivers to medical practitioners has made it more difficult for medical practitioners to become certified. Additionally, time, money, travel, and motivation all play a part in whether one is willing to be admitted into treatment and for them to remain in treatment. Traveling and schedule conflicts pose a major barrier when it comes to treatment, in which many clinics will dismiss patients due to lack of attendance, which decreases the accessibility aspect of treatment (Stokes & Perrone, 2022).

Despite all these barriers, there are policies that are being implemented in cities throughout the United States in order to address and decrease the current treatment gap, and to offer effective treatment to populations at risk.

Via. Current MAT Treatment Effectiveness

Effective treatment for Opioid Use Disorder is now a national priority in order to reduce the rates of fatal overdoses, societal costs, and individual disabilities linked to this disorder. In a meta-analysis conducted by Connery et al., they analyzed multiple randomized control trials (n=502) in order to determine the effectiveness of current OUD treatment. They found that individuals treated with Methadone had higher retention rates and lower opioid usage compared to Buprenorphine and Naloxone.

At the same time, Methadone treatment has been associated with several negative side effects such as “sedation, constipation, sweating, neurocognitive impairment, and sexual dysfunction”(Connery et al, 2015). They also found that within the initiation period, euphoric effects can be present among individuals, which may encourage the usage of other opioids.

Individuals randomly controlled to the buprenorphine group presented fewer side effects, in which only mild respiratory depression was present in only a few cases. Additionally, Methadone has numerous drug interactions due to the enzymes involved in its metabolism. Both Buprenorphine and Naltrexone have fewer drug interactions. Moreover, methadone takes time to achieve a steady-state dose that is considered therapeutically effective, which can be associated with an increased dropout rate due to effects associated with misdosing methadone. Compared to Buprenorphine, Suboxone, and Naltrexone that have a rapid induction period and are correlated with reduced undesirable effects (Connery, 2015).

Undesirable effects that are often presented within the treatment induction phase (1-month treatment) may correlate to the high dropout rate. In order to reduce current dropout rates, individuals need to be properly assessed in order for their treatment plan to be more adaptable to their needs. From the meta-analysis conducted by Connery et al., they examined

various factors that play a role in the effectiveness of current medication treatments in relation to retention. Factors such as clinical setting, access, therapeutic preferences, occupation, comorbidities, and motivation should all be considered when assessing treatment needs (Connery, 2015). Properly assessing an individual using a “whole patient approach” is an imperative aspect in creating treatment frameworks.

Viii. Increasing Outcomes Dependent on Opioid Usage

Another aspect that should be considered when developing individualized treatment protocols is assessing which type of opioid was being abused. A study conducted by Moore et al., found that individuals who had been abusing painkillers (e.g. oxycodone/ hydrocodone) responded more positively to Suboxone treatment compared to heroin users in the same treatment group. They found that 59% of individuals who had been abusing prescribed pain killers completed treatment, compared to 30% of heroin users (Moore et al., 2007). Another study conducted by Anderson et al., found that methadone maintenance therapy was most effective for individuals with chronic pain and who had been abusing heroin because of its analgesic properties (Anderson & Kearney, 2000). Factors such as past drug usage should be assessed in order for individuals to receive the medication that would benefit them best. Unfortunately, the majority of studies do not account for various characteristics and variations in response to settings where participants have received treatment.

Viii. Increasing Buprenorphine Administration

As previously stated, Medical Practitioners are able to become certified in Buprenorphine administration for MAT treatment. Medical practitioners are one of the main groups of individuals that are faced with handling patients with OUDs. Medical practitioners, such as primary care doctors, should be allowed to treat and monitor individuals with OUD.

To begin, buprenorphine can be prescribed by one's primary care doctor. In order to be approved to administer Buprenorphine, practitioners must complete a waiver in order to be certified. Receiving the certification of approval isn't complex, though there are underlying steps that limit one's ability to administer buprenorphine to everyone. Implementing educational programs for medical students could potentially increase treatment initiation by educating future medical providers to provide Buprenorphine to patients with OUD . In 2018, multiple departments in charge of Substance Abuse Disorder Prevention and Recovery funded medical schools in order to educate students in order for them to meet waiver training requirements. Additionally, there have been some efforts in order to decrease the amount of steps one has to take in order to be able to administer buprenorphine.

Increasing the number of medical practitioners that could administer buprenorphine could potentially decrease the current treatment gap and increase treatment initiation. Medical practitioners could play a major role in treating individuals with OUD, especially those who have a history of abusing prescribed narcotics (Anderson & Kearney, 2000). Additionally,

patients often have a rapport with their primary care doctor which could aid in increasing treatment compliance and motivation.

VI. Novel Strategies at Increasing Treatment Initiation

Increasing treatment initiation is a difficult but necessary step in addressing the current opioid crisis. Populations most at risk for fatal overdoses need to be prioritized in the making of newer public policies that address the Opioid Crisis. Vulnerable populations, such as newly released incarcerated individuals, homeless individuals, are often put on the back burner when it comes to public crises, in which millions of individuals disproportionately suffer the consequences of unequal policy changes.

Treatment initiation protocols and other forms of harm reduction educational programs are essential in reducing the risk of fatal overdoses. The lack of accessible treatment and stigma surrounding substance abuse disorders are at the root of the current treatment gap. Furthermore, current policies within the health care and justice systems fail to address the needs of populations most at risk.

Vii. Novel Initiation Strategy: CATCH

The majority of individuals with OUD end up in the emergency department before they seek treatment. Current Emergency Department protocols do more harm than good. The current protocol in Emergency Departments is to medically detox the individual and discharge them. The current protocol isn't effective and increases the risk of fatal overdoses due to lack of therapeutic intervention and decreased tolerance. A pragmatic study conducted by Mckneely et

al., addresses the failure of current Emergency Department Protocols and assesses a novel approach to treatment initiation.

In New York City, public policy officials have implemented a new program in 6 public hospitals that targets individuals who are admitted to the Emergency Department. A study conducted by McNeely et al., analyzed a novel initiation program called CATCH. CATCH stands for “Consult for Addiction Treatment and Care in Hospitals” and aims at initiating OUD treatment to patients who come to the emergency room due to an opioid- related overdose or other medical problems associated with opioid usage. Patients who are admitted are met with the CATCH team, which consists of: medical provider, social worker/addiction counselor, peer counselors. Patients will be assessed by a medical provider in order to make treatment recommendations that cater to the individual's needs. During the same period, both a social worker and an addiction counselor will meet with the patient and provide motivational counseling and treatment options. Additionally, patients will receive overdose prevention training. One of the team members would then bring the patient to an outpatient treatment facility in order for them to receive their first dosage of MAT medication. This approach not only targets at-risk populations but treats the patient as a “whole individual”.

The pragmatic study aimed at analyzing whether this new program was effective and whether that adoption, implementation, and maintenance could be observed. They found that this program not only increased treatment initiation but also increased treatment retention. The study analyzed treatment retention at 6 months and found that 80% of individuals remained in treatment.

Programs such as CATCH are not only effective at targeting at-risk populations, but are also cost effective. It has been estimated that 11 billion dollars are spent on treating individuals with OUD annually (Premier, 2022). Individuals who are admitted into the hospital often present with complicated physical illnesses. Around 40% of cases deal with organ failure. Organ failure requires extensive ICU care that is often expensive. Furthermore, readmission rates are high due to lack of proper treatment. The current Emergency Department protocol for patients with opioid related complications correlates with a 90% relapse rate and a higher risk of fatal overdose due to reduced tolerance and lack of overdose education. CATCH has the possibility to drastically reduce opioid-related fatalities, readmission hospitalization costs and further target the current Treatment Gap (McNeely et al., 2019).

Viii. Treatment Initiation: SHOW

Another program similar to CATCH has been initiated in New York City as well. The program is called SHOW (Street Health Outreach and Wellness) which has been funded by the Test and Trace Corporation. The Test and Trace Corporation was the main organization in NYC that managed the current Covid-19 public crisis. SHOW targets at-risk populations, mainly individuals who are suffering from homeless and other disabilities. They provide Covid-19 tests and vaccinations, basic medical aid, and harm reduction resources. SHOW is able to target the needs of homeless individuals and provide them with effective equitable care.

Moreover, the organization is composed of multiple team members in order to provide individualized services for individuals with Opioid Use Disorder. The team is made up of nurses,

EMT's, and social workers. This team provides extensive resources to those who are suffering from homelessness. For one, they provide overdose education training along with distributing Narcan and fentanyl test strips, sterile needles... They also will provide individuals with a full physical and mental exam. Secondly, they provide mental and physical assessments in order to provide proper care to individuals. They also assess individuals in order to provide them with referrals to treatment centers along with providing additional support if needed.

SHOW is an organization that increases accessibility to treatment and harm reduction education.

Current harm reduction educational programs have been shown to be effective at educating individuals on opioid overdose prevention, though there are some drawbacks. Harm reduction in the form of educational training has been shown to be effective at educating individuals, though these educational programs often do not target at-risk populations such as homeless individuals. Harm reduction training and education is imperative in reducing the rate of fatal overdoses by providing resources and Narcan in order to prevent fatalities. A study conducted by Heavey et al., in 2018 found that harm reduction in the form of Overdose Education and Naloxone (Narcan) distribution (OEND) is an effective harm reduction approach, though the program does not target at-risk populations. The participants in the study (N=198) attended training sessions in order to learn about the signs of an overdose, and how to administer Narcan. Participants at the end of the training were more informed about opioid related overdoses and how to reverse the effects using Narcan. The majority of the participants were not individuals who had relationships with opioid users (Heavey et al., 2018). From this, providing overdose education resources can dramatically reduce the rate of preventable fatal overdoses from occurring.

SHOW dedicated team of medical and mental health care providers are able to deliver effective resources to at-risk populations. Not only are they providing resources on harm reduction strategies (e.g. narcan, fentanyl test strips, clean needles...), they also help individuals who are willing to start treatment to be referred to an outpatient Buprenorphine treatment center or to other resources that may provide mental and physical care (*The NYC Test & Trace Corps Launches Buprenorphine Treatment Pathway From Harlem To Hollis To Help With Opioid Use Disorder*, 2022).

If more cities implement programs such as CATCH and SHOW it could potentially be a major step forward in effective equitable public health care.

Viii. Increasing Access to Treatment within the Criminal Legal System

The Criminal Legal System is another system that needs to provide Opioid Use Treatment and overdose prevention training for incarcerated and newly released incarcerated individuals. America's war on drugs has fueled the prison industry and has perpetuated discriminatory practices within the criminal justice system. Furthermore, substance abuse disorders are one of the major disorders that are present within the prison system. It has been estimated that around 24%-36% of individuals who abuse heroin pass through one or more correctional facilities annually, which amounts to about 200,000 individuals each year. Due to improper treatment, many of these individuals will undergo severe withdrawal symptoms that perpetuate increased drug usage within correctional facilities. Recent research done by SAMHSA, found that 75% of individuals who have a history of opioid abuse relapse when they

are released. Due to diminished tolerances, and that more illicitly made drugs are laced with fentanyl, these individuals are 10 to 40 times more likely to die from an opioid overdose.

In addressing the rates of fatal overdoses among newly released inmates, more Opioid Use Disorder Treatment (MAT) needs to be implemented. Within the study conducted by SAMHSA, only 2 to 10% of released incarcerated individuals with OUD were in MAT treatment. Additionally, around 50% of drug courts have prohibited individuals from receiving Methadone or Buprenorphine (see figure 7). The purpose of Drug Courts is to provide individuals with treatment for substance abuse disorders and their current protocols are not adapted to the needs of individuals and has led to 80% of individuals not completing Drug Court requirements. Moreover, the extremely small percentage of released incarcerated individuals receiving MAT treatment demonstrates the ineffectiveness of current prison systems at “rehabilitating” individuals in order for them to return back to society. Furthermore, the strict protocols administered within the Drug Court perpetuate barriers that inhibit one from receiving treatment and further perpetuate rates of addiction. Providing proper treatment that provides both pharmacological and psychological behavioral therapies along with harm reduction education programs could potentially decrease the rate of fatalities, improve quality of life, and reduce the

rate of reincarceration.



Fig. 7 The figure above illustrates the lack of Opioid Use Disorder treatment within the criminal justice system. There are many factors that are at play, such as the discriminatory practices present within the criminal justice system, lack of education, stigma surrounding addiction and addiction treatment... (Breaking the Cycle, n.d.).

Public Health organizations such as SAMHSA have been at the forefront of implementing Opioid Use Disorder treatment within the Criminal Justice System. Providing MAT to individuals who have been assessed for OUD and allowing them to complete treatment within the correctional facility could decrease the risk of fatal overdoses once released.

Furthermore, providing continuative care once individuals are released would also decrease the chances of relapse and re-incarceration. It has been shown that individuals suffering from past Opioid Use Disorder are much more likely (40-50% of individuals) to be reincarcerated within a couple months of their release.

There are many barriers in the way that inhibit MAT from being provided within the criminal legal system. Barriers such as: lack of knowledge, current policies not supporting MAT, security and liability concerns, and cost. These barriers will continue to be upheld unless proper policies can be implemented. On the other hand, in 2019, SAMHSA funded multiple judicial systems in order for them to incorporate OUD treatment. Current drug court protocols often do not provide adequate treatment for individuals with OUD and often prohibit individuals from receiving MAT. SAMHSA has funded 42 adult drug courts, 12 family drug courts, and two programs to provide MAT. Implementing MAT within the current criminal justice systems could correlate with a drop in reincarceration and fatalities (*Breaking the Cycle*, n.d.).

VII. Treatment Retention Strategies

Funding for Public Health policies that target at-risk populations is an essential part in reducing the rate of opioid- related fatalities as well as increasing treatment initiation. Populations that are at a higher risk of opioid- related fatalities are in need of more accessible and effective care in order for rates of fatalities to decrease. Opioid Use Disorders are often chronic illnesses, in which relapses are part of treatment. Increasing retention rates would not only further decrease the current treatment gap but also increase one's ability to return to a "regular" life.

Current treatment protocols are unfortunately associated with high rates of dropouts which limits the effectiveness of current MAT/MOUDS. There are many factors associated with the high dropout rates such as: lack of behavioral therapy, poor familial support, transportation, scheduling conflicts, presence of withdrawal symptoms, and strict protocols. Increasing initiation and retention within a whole patient approach to treatment frameworks is an important next step.

Viii. Novel Retention Strategies

Increasing treatment initiation has the possibility to increase retention rates as well. Depending on how individuals are admitted into treatment and what types of medication and psychotherapeutic approaches are available correlates with retention rates. The “whole patient approach” (p.32), increases retention rates because of improved motivation and compliance to treatment. Additionally, a harm reduction approach to treatment also improves retention rates because of its patient-centered approach.

Harm reduction programs are making headlines due to their ability to save lives. Harm reduction as a whole aims at meeting individuals where they are and providing: sterile injection needles, narcan training/overdose prevention education, fentanyl test strips, and more in order to reduce the rate of blood-borne infections and preventable fatal overdoses. A harm reduction approach to treatment differs from current treatment protocols, in which the patient has more say in their treatment plan along with increased access to primary and mental health care. Oftentimes, within treatment facilities, individuals may still continue to abuse drugs. Since

Opioid Use Disorders are chronic disorders, relapses are part of treatment. Current protocols implemented within healthcare models for Opioid Use Disorder treatment are often strict and do not put an emphasis on patients' needs. It has been shown that 30% of involuntary buprenorphine treatment drop-outs are linked to poor attendance and/or positive drug screenings. (Kapedia, 2021). A study conducted by Bruneau et al., found that by retaining individuals who've had positive drug screenings in treatment, drastically reduces their risk of harm and increases retention rates (Bruneau et al., 2018).

The harm reduction philosophy, when applied to healthcare settings, has the potential to reduce stigma around substance use disorders in order to increase accessibility and effectiveness of treatment. A program called REACH (Respectful, Equitable Access to Compassionate Healthcare) provides treatment that implements a harm reduction philosophy. REACH provides patients with primary care services, mental health services, and social services (**fig.8**). Additionally, REACH provides funding to healthcare providers in order for them to become certified in prescribing and administering Buprenorphine (*Respectful and Equitable Access to Comprehensive Healthcare Program | Mount Sinai - New York*, n.d.). Providing a multitude of resources to individuals with OUD is crucial in treating the physical and mental ailments that may be present.

Services Provided				
Substance Use Disorder	HCV and HIV	Primary Care	Mental Health	Social Services
<ul style="list-style-type: none"> • Buprenorphine Treatment • Naloxone distribution 	<ul style="list-style-type: none"> • HCV and HIV Testing • HCV treatment • HIV PrEP 	<ul style="list-style-type: none"> • Acute care • Chronic disease management • Wound care • Preventive health 	<ul style="list-style-type: none"> • Psychiatric evaluation • Medication treatment 	<ul style="list-style-type: none"> • Food donation • Clothing donation • Care management

Fig.8. The services provided in the model above aid at increasing treatment retention. Individuals with OUD often are in need of additional physical, social, and mental health services in order to recover (*Respectful and Equitable Access to Comprehensive Healthcare Program | Mount Sinai - New York, n.d.*).

VIIIiii. Implementing a Harm Reduction Philosophy

The current healthcare model for OUD treatment increases barriers that dismiss individuals from receiving long term individualized treatment. These barriers further impose stigma around substance abuse that perpetuated the continued cycle of abuse. Furthermore, within the current framework of OUD treatment, the institution and the medical providers have more say over treatment plans compared to their patients. Current protocols may not take into account individuals personal needs and wants when it comes to receiving treatment. By removing these barriers and including a harm reduction philosophy into current treatment models, along with providing adequate social/health/mental care to accompany MAT treatment retention rates would increase. Furthermore, patients would not be dismissed due to lack of attendance and/or positive drug screenings. Instead, these individuals would be provided with resources in order to potentially increase compliance and motivation to change.

VIIIiii. Reducing Barriers: “Treatment On Demand”

Individuals with Opioid Use Disorder may drop out of treatment due to scheduling conflicts. Scheduling around treatment often interferes with individuals lives and social/familial/work obligations. The study proposed that “Treatment on Demand” allows for flexible scheduling and can be associated with reduced wait times, increased initiation and retention. Furthermore, within this low-barrier approach to MOUD (Medication for Opioid Use Disorder), the incorporation of non-clinical support such as behavioral therapy, peer support groups, family therapy would be available for patients as well. Additionally, in order to increase flexibility, psychotherapeutic approaches could happen via telemedicine or via text messages. Decreasing barriers and increasing access to treatment via treatment on demand, flexible scheduling, patient oriented approach, and access to telehealthcare has the possibility to increase treatment initiation and retention (Madras et al., 2020).

More supporting evidence for the effectiveness of the Harm Reduction Model for OUD within a primary care setting can be shown in the study conducted by Bruneau et al. Within this study, they analyzed the effectiveness of treatment protocols that align with the Harm Reduction Approach. Within this analysis they lay out a model of care (**fig.9**) that implements different lines of treatment in conjunction with harm reduction education (Bruneau et al., 2018).

Within their analysis, they created a treatment model that would increase initiation and retention rates. To begin, Suboxone (Buprenorphine -Naloxone) should be the first line of pharmacological treatment because of its favorable safety margin and its ability to be prescribed within a primary care setting. Additionally, Suboxone can be brought home in order to increase treatment flexibility. Individuals who do not respond positively to Suboxone would then be

administered Methadone. They also assessed the effectiveness of different pharmacological treatments dependent on individuals' drug usage. They found that individuals who have been abusing prescription pain medication respond best to Suboxone or Buprenorphine compared to heroin users. Methadone as a second line to treatment often works best for individuals who have been abusing heroin and/or fentanyl.

Additionally, within this study they analyzed another pharmacological approach to OUD treatment. Individuals who do not respond to both the first (Suboxone) and second (Methadone) line of treatment can be administered slow-release morphine. Previous meta-analyses have found slowed release Morphine does not decrease retention rates compared to Suboxone and Methadone treatment (Bruneau et al., 2018)

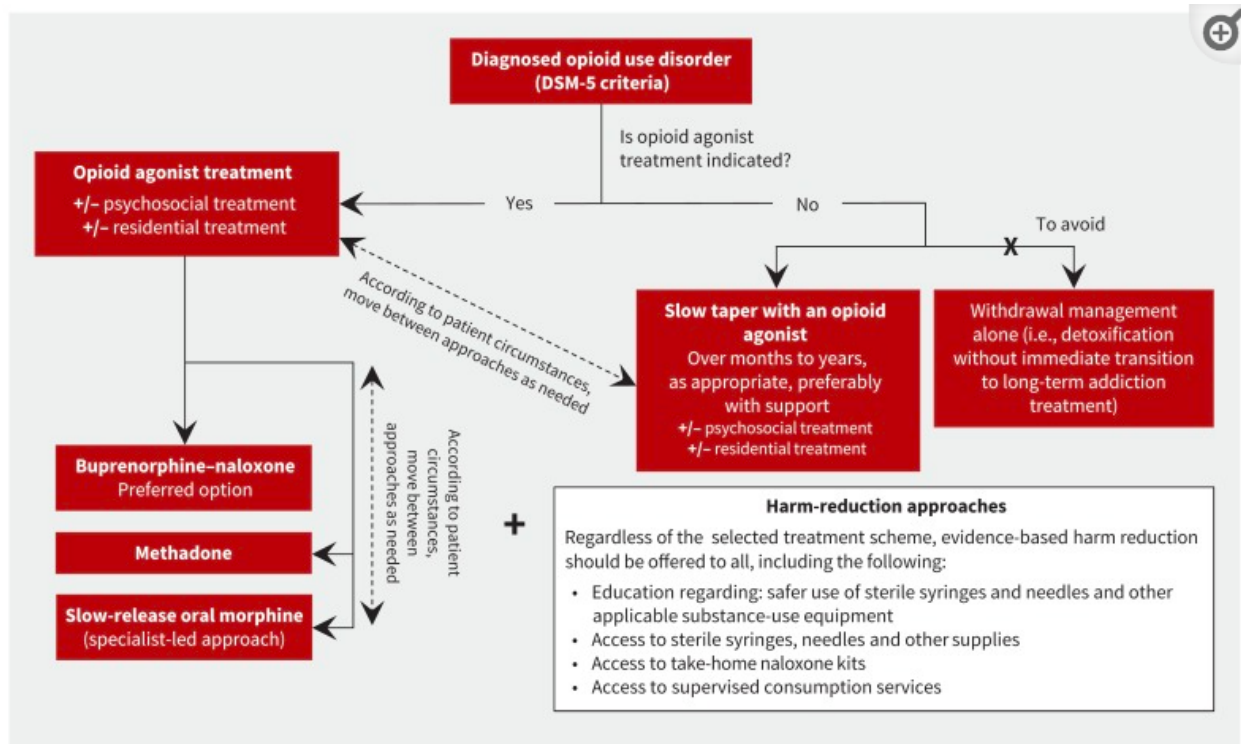


Fig. 9. The model above outlines the treatment model discussed in the Bruneau et al study.

Individuals diagnosed with OUD should be assessed in order to better evaluate the severity of their

disorder. Depending on the severity of one's disorder, Opioid Agonist treatment may differ (Suboxone, Methadone, or Slow-Release oral morphine). Psychosocial treatment should also be offered in order for factors that are at play within one's substance abuse disorder to be properly addressed. (Bruneau et al., 2018)

VIIIiii: CDC'S Response to increasing OUD Treatment Effectiveness

In 2022, the CDC released a guiding framework to prevent Opioid Overdoses and other Harm related to Substance Abuse Disorders. The current Covid-19 pandemic has exacerbated the Opioid Crisis, in which opioid-related deaths are the leading cause of injury-death. They've identified numerous factors that are at play in the drastic increase in deaths. For one, there has been a drastic increase in polydrug deaths, in which individuals often suffer from one or more substance abuse disorders. Comorbidities increase one's risk of overdosing due to the increased presence of laced drugs that are being sold.

The CDC's work at addressing the current Opioid Crisis is guided by six principles. For one, promoting health equity, in which everyone has access to harm reduction educational programs and treatment. Programs such as CATCH, SHOW, REACH, and SAMHSA's treatment initiation strategies increase access to said resources and target at-risk populations that have been stigmatized and ostracized by current healthcare protocols. Secondly, Addressing Underlying Factors such as physical and mental health disorders and creating a framework of care that targets these factors can increase the effectiveness of current treatment protocols. Implementing a harm reduction approach that is geared towards Patient Oriented Treatment Plans in conjunction

with psychotherapeutic and physical health support can potentially drastically decrease the rate of fatal overdoses and comorbidities. Thirdly, Partner broadly, in which multiple systems implement targeted strategies to reduce Harm. Systems such as the Criminal Justice System, Educational Systems, and Public Health Care systems have the possibility to increase education and treatment initiation programs to target at-risk populations in order to increase treatment initiation and retention rates. Fourthly, “Advancing Science” which can be seen by continuing to research treatment options in order to offer more effective and accessible treatment options to individuals with Opioid Use Disorders and other Substance Abuse Disorders. Lastly, “Drive Innovation”, in which novel strategies should be evaluated in order for them to become implemented within current treatment protocols (MAT/MOUDS).

The Initiation Strategies and Retention Strategies discussed in Chapter 6 and 7 have addressed these guiding principles and have paved the way for more accessible treatment options to be available to populations most at risk. Increasing harm reduction education and resources to at-risk populations and increasing treatment options via a Primary Care Model have the possibilities to break down the current barriers that are at play in the current Treatment Gap. They are all evidence based and target various systems that are at play within the Current Opioid Crisis.

There are also five strategic priorities to address the Overdose Crisis. For one: Monitor, Analyze and Communicate Trends, in which statistics and field research needs to continue in order for resources to be focused on where they are needed most. Secondly, Build State, Tribal, Local, and Territorial Capacity, in which public health leadership needs to collaborate with various sectors in order to detect drug usage trends, promote education, and prevent overdoses.

Support Providers, Health Systems, Payors, and Employers in order to prevent opioid misuse and abuse and mitigate stigma surrounding Substance Abuse Disorders within the current Healthcare Model. This can be seen by increasing education around Buprenorphine prescription certification and administration within a Primary Care Setting. Additionally, programs such as CATCH and SHOW have the ability to reduce gaps in treatment and targeting at risk populations. Fourthly, Partner with Public Safety and Community Organizations in order to increase partnerships through public health strategies on a national, state, and local level. SAMHSA's strategy to increase access to treatment within the criminal system increases the link between individuals and treatment along with reducing the current treatment gap and addressing risk factors. Lastly, Raise Public Awareness and Reduce Stigma in order for barriers within current health care systems to be dismantled. Stigma surrounding substance abuse disorders is at the root of the current treatment gap and disables individuals from seeking treatment in the first place.

Increasing awareness and education surrounding the Opioid Crisis has the potential to mitigate biases and prejudices against individuals with Opioid Use Disorders. Implementing a patient orientated approach to treatment increases compliance to treatment and autonomy to treatment, in which the individual has more trust and motivation in treatment. Additionally, a harm reduction approach reduces stigma around Substance Abuse Disorders by understanding the complexity of the disorder and the fact that it is a Chronic Disorder with multiple factors at play. Endorsing non-stigmatizing language in a patient-oriented approach to treatment could improve motivation.

As more states begin to implement these guidelines, it is also imperative that populations most at risk are targeted. The current barriers such as lack of education and stigma surrounding

Opioid Use Disorders further enable the current crisis to evolve and worsen. The strategies previously mentioned have implemented these guiding principles and strategies in order to decrease harm and increase initiation and retention rates.

VIII: Discussion

In 2021, fatalities due to opioid overdoses reached a record high in which 100,000 individuals died. These overdoses could have been prevented. The introduction of prescription opioids into the United Healthcare system is at the root of this statistic. Purdue Pharma and their unethical practices of persuasion led millions of doctors to prescribe opioids despite their historically known addictive properties. Populations who were most susceptible to addiction were first targeted due to high rates of chronic pain and their ability to increase profit. There were very few measures implemented in order to analyze and assess individuals risks of Oxycodone misuse.

Anyone who is prescribed oxycodone has a risk of developing an addiction. Individuals with chronic pain, homeless individuals, newly released incarcerated individuals with OUD, are at a much higher risk of overdosing. Implementing strategies that target these populations in order to increase treatment initiation and retention is imperative.

A "Whole Patient Approach" and patient- oriented framework and the inclusion of a Harm Reduction Philosophy to current MAT treatment has the potential to increase the effectiveness of current MAT treatment. Moreover, increasing the administration of Buprenorphine within a Primary Care setting can also increase treatment initiation and reduce

the current treatment gap. Along with implementing MAT treatment within an Emergency Department setting could drastically reduce the rates of readmission and fatalities associated with opioid overdoses. From previous research, Buprenorphine and Suboxone are more favorable in terms of their ability to provide care in more settings. At the same time, depending on one's past drug usage individuals should be able to be administered Methadone which has been shown to increase retention among heroin and fentanyl users. Medication always needs to be paired with some form of behavioral therapy along with physical, social, and mental health care in order to treat the individual as a whole.

Moreover, increasing MAT treatment within the criminal justice system could reduce the risk of fatal overdoses for newly released inmates along with reducing the rate of reincarceration. SAMHSA has been pushing policy makers into implementing MAT treatment within the criminal justice system along with providing continuative care once inmates are released. Furthermore, they have funded numerous programs in order for MAT and other social services to be implemented within the Criminal Justice System. Increasing MAT treatment and other modes of social services surrounding substance abuse disorders like OUD within the justice and prison systems could potentially drastically decrease the rate of fatal overdoses and reduce the current cost associated with imprisonment.

Unfortunately, due to limitations in research and understanding the effects of Opioid Use Disorders on different populations, we cannot conclude that one form of treatment is better than others. Creating treatment frameworks that are geared towards a patient oriented approach has been shown to be effective at increasing retention rates. Additionally, providing Buprenorphine as the first line of treatment is more accessible compared to Methadone. At the same time,

individuals who have a history of abusing more potent opioids such as heroin and/or fentanyl often respond more positively to methadone treatment. Meaning that treatment needs to be individualized, which could pose a major economic hurdle within healthcare facilities. Furthermore, individuals who suffer from a chronic Opioid Use Disorder often present other substance abuse disorders and comorbid mental health disorders. As more research is being conducted throughout the United States, it is important that treatment should address and provide adequate care and support for individuals with comorbid substance abuse and mental health disorders. Additionally, due to barriers within many systems that need to provide MAT treatment, it may be more difficult to implement treatment protocols due to restrictions within these systems. Moreover, in order to properly evaluate the efficacy of novel treatment strategies, more states need to implement them in order to assess their overall effectiveness.

As more states receive funding in order to address the Current Opioid Crisis, they should implement strategies that have been shown to reduce the treatment gap and provide equitable MAT treatment to populations at risk. Organizations such as CATCH, SHOW, REACH, and SAMHSA have implemented public health policies that decrease barriers in accessing treatment and provide individuals with continuative MAT treatment.

Conclusion

The Opioid Epidemic is long from being over. Due to the continued prescription of oxycodone and other prescribed opioids, we will continue to see increased rates of Opioid Use Disorders. Additionally, as more street drugs continue to be laced with fentanyl, the rate of fatal overdoses may continue to rise. In order to tackle the epidemic, we need to address those who

are already suffering from Opioid Use Disorder. Along with providing more harm reduction resources to populations most at risk. Providing both harm reduction resources and increased access to equitable treatment via the strategies previously mentioned could be a major step forward in combating the crisis.

Implementing more treatment options involving a Whole Patient Approach, a Patient Oriented Approach, and a harm reduction philosophy could drastically decrease the current treatment gap and increase retention rates. As retention rates increase, the more effective MAT treatment would be. Additionally, by providing more education surrounding OUD in primary care facilities could increase the administration of Buprenorphine in order to decrease the current treatment gap. Creating effective models of care for individuals with Opioid Use Disorders is important in order for more states to implement equitable treatment frameworks.

Appendix

Diagnosis of Opioid Use Disorders

According to the DSM-5, in order to be diagnosed with OUD one has to meet one or more of the following criteria over a 12-month period.:

1. Taking larger amounts or taking drugs over a longer period than intended.
2. Persistent desire or unsuccessful efforts to cut down or control opioid use.
3. Spending a great deal of time obtaining or using the opioid or recovering from its effects.
4. Craving, or a strong desire or urge to use opioids
5. Problems fulfilling obligations at work, school or home.
6. Continued opioid use despite having recurring social or interpersonal problems.
7. Giving up or reducing activities because of opioid use.
8. Using opioids in physically hazardous situations.
9. Continued opioid use despite ongoing physical or psychological problems likely to have been caused or worsened by opioids.
10. Tolerance (i.e., need for increased amounts or diminished effect with continued use of the same amount)
11. Experiencing withdrawal (opioid withdrawal syndrome) or taking opioids (or a closely related substance) to relieve or avoid withdrawal symptoms. (Dydyk et al., 2021)

The ASAM National Practice Guideline for the Use of Medications in the Treatment of Addiction Involving Opioid Use, 2015

FDA-Approved Medications to Treat OUD

Medication	Mechanism of action	Route of administration	Dosing frequency	Available through
Methadone	Full agonist	Available in pill, liquid, and wafer forms	Daily	Opioid treatment program
Buprenorphine	Partial agonist	Pill or film (placed inside the cheek or under the tongue)	Daily	Any prescriber with the appropriate waiver
		Implant (inserted beneath the skin)	Every six months	
Naltrexone	Antagonist	Oral formulations	Daily	Any health care provider with prescribing authority
		Extended-release injectable formulation	Monthly	

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