Medication-assisted treatment for Opioid Use Disorder: a review of an effective treatment and its potential improvement for better outcomes

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Opioid Use Disorder is characterized as problematic use of opioids that causes significant impairment or distress. Opioids include prescription analgesics, synthetic opioids such as fentanyl, and the illegal drug heroin. Opioids interact with brain receptors that are associated with pain, reward, and addiction behaviors. 2.1 million people struggle with Opioid Use Disorder in the United States according to the Substance Abuse and Mental Health Services Administration. Only 20% of these people have received specialty addiction treatment and in 2016 there were over 42,249 opioid-related deaths. Medication-Assisted Treatment is the use of FDA-approved drugs implemented with psychotherapies with the purpose to provide a personalized approach to sustained recovery, defined as illicit opioid abstinence. This combination treatment has been evidenced to positively impact patient outcomes, but is underused and limited by several issues of access. Further research involving the medications and psychotherapies used in Medication-Assisted Treatment in addition to an improvement of the treatment’s access will provide a significant impact on individual OUD patient lives as well as on our country’s public health as a whole.

Abbreviations: OUD – Opioid Use Disorder; MAT – Medication-Assisted Treatment; SAMHSA – Substance Abuse and Mental Health Services Administration; ASAM – American Society of Addiction Medicine

Keywords: Opioids; Opioid Use Disorder; Medication-Assisted Treatment; Substance Abuse

Opioid Use Disorder

Opioid Use Disorder (OUD) has become a significant public health issue identified by the United States Department of Health & Human Services as a national crisis (Center for Disease Control and Prevention, 2018). A growing population of OUD patients and an increase in the recorded incidences of opioid-related overdose have elevated the critical need for an effective and maintainable treatment. Increasing by 21.5% from 2015, in 2016 a record number of drug overdoses in the United States. 66.4% of these overdoses involved opioids (Center for Disease Control and Prevention, 2018). Additionally, 11.5 million people of the 91.8 million adults that were users of prescription pain killers in 2015, self-reported that they had personally misused prescription opioids during that year (Substance Abuse and Mental Health Services Administration [SAMHSA], 2017). Addiction to opioids and OUD have become an aggressive issue for our public health. According to the American Society of Addiction Medicine (ASAM), addiction, including OUD, is a primary chronic disease of the brain’s reward, motivation, and memory circuitry (American Society of Addiction Medicine [ASAM], 2015). A chronic disease is defined as conditions that last at least one
year or longer and require ongoing medical attention and/or or limit an individual’s daily activities (Center for Disease Control and Prevention, 2018). OUD, like any other chronic illness such as diabetes, Alzheimer’s, or asthma, needs to be treated and managed to prevent adverse effects and mortality. However, OUD like most chronic diseases cannot be fully cured (Leshner, 1997).

Drug addiction is classified as a chronic brain disease. This highlights the changing brain structure and function of individuals with this disease and therefore has significant implication for treatment therapies (Leshner, 1997). The brain of a person addicted to opioids does not function the same as that of a healthy individual. Opioid receptors in the brain are largely located in the locus coeruleus (LC) and when opioids, either endogenous opioids like those released during exercise or unnatural opioids not made by the body like heroin or oxycodone, attach to these receptors they are activated. Once activated the release of noradrenaline is prevented. Noradrenaline is a neurotransmitter that can either stimulate or suppress alertness and blood pressure in the body. This causes symptoms of drowsiness, slowed respiration, and pain-relieving effects. Additionally, this activation of the opioid receptors causes the release of dopamine, another neurotransmitter involved in the brain’s reward system and feelings of pleasure called dopamine. (Kosten & George, 2002). In the case of opioid dependence, the excess opioid molecules bind with receptors in locus coeruleus (LC), suppressing noradrenaline release in the brain and causing a pleasurable euphoria as well as extreme symptoms known as opioid intoxication. Low blood pressure, respiratory depression, and extreme confusion or drowsiness are some examples of these symptoms. With the repeated exposure to excess opioids that comes with abuse, the LC neurons adjust by increasing their own level of activity, releasing excessive amounts of noradrenaline to offset the opioids suppressing effect. This mechanism ultimately results in altered brain function in addicts (Fareed, 2011). In an addicted individual who stops using, the absence of opioids leads to a failure in the suppression of this excessive activity in neurons of the LC, causing symptoms like anxiety, jitters, cramps, and diarrhea, also known as withdrawal. Withdrawal and its symptoms create a large and physically stressful obstacle for patients in treatment (Kosten & George, 2002). In addition to the LC, opioids also stimulate dopamine release in the ventral tegmental area (VTA) of the mesolimbic reward system. The overstimulation of these VTA neurons from chronic abuse further alters the brain, causing a desensitization and tolerance to opioids, manifesting in a greater need for the drug that drives negative drug seeking behavior.

The altered brain function behind the devastating withdrawal and persistent drug cravings of OUD can ultimately take over the lives of many patients who do not receive the proper treatment. OUD’s impact on the brain and its functioning is an important consideration when determining the most effective methods and approaches to achieving a sustainable state of abstinence. The disease’s cycling states of relapse and recovery stem from an altered brain state and can make a sustained, long-term recovery difficult for many patients. (Simpson & Marsh, 1986). With no quick or easy fix for opioid addiction, as willpower alone is not the answer to recovery, an effective treatment that addresses the chronic nature as well as the dysregulated brain function is essential in recovery. Few effective treatments are currently available to OUD patients, making the expansion and
development of these treatments’ imperative.

Medication-Assisted Treatment for OUD

Since opioid addiction is a chronic disease of the brain, effective treatment for OUD requires a continuous and personalized approach to symptom management. Medication-Assisted Treatment (MAT) dominates the literature surrounding OUD treatment with leading outcomes in improving patient care (SAMHSA, 2018). Strongly supported by research looking at medication and its crucial role in opioid treatment maintenance, relapse prevention, and drug overdose, MAT is a treatment rooted in evidence that is shown to produce measurable and positive clinical outcomes for patients. Outcomes such as increased treatment retention, lowered relapse rates, and reports of a decreased intensity of drug cravings being some of significant changes for patients in clinical trials (Comer, 2006; Kakko, Svanborg, Kreek & Heilig, 2003). MAT for OUD by definition consists of one of three medications; buprenorphine, methadone, or naltrexone, paired with psychosocial or behavioral therapies (Center for Disease Control and Prevention, 2018). MAT methods can help patients avoid overdose, best manage their addiction, and improve and extend their quality of life. The best strategy to addressing OUD treatment, MAT provides an essential flexibility in a combinatorial approach. This personalized treatment for individuals addresses the detrimental brain and behavioral changes involved in OUD, allowing patients to recover by coping with initial withdrawals as well as persistent drug cravings. As an effective treatment, efforts to expand MAT usage and promote the development of medication options has already become a focus of many associations including the Food and Drug Administration. Notably, issues of access involving insurance coverage as well as availability of MAT are two pain points for patients currently seeking treatment. Fixing these pain points surrounding MAT will be essential in improving and saving the lives of many individuals who are impacted by opioid use and addiction (Food and Drug Administration, 2017). MAT’s current success in OUD treatment is backed by research on both the medications and psychotherapies that the method implements. The expansion of research involving MAT, as well as access to the both the pharmacological and psychotherapeutic aspects of MAT, can drastically improve OUD patient outcomes.

Medication Options in MAT

Currently there are three FDA approved drugs that are used in MAT: buprenorphine, methadone, and naltrexone (ASAM, 2015; Bart, 2012). All of the medications act directly on the body’s opioid receptors in different ways. Methadone is a full agonist, buprenorphine is a partial agonist and naltrexone is a full antagonist. Due to their various mechanisms of action, each medication has different clinical effects and advantages in OUD treatment (ASAM, 2013).

Methadone

Methadone is the longest standing medication and has the largest body of literature supporting its effectiveness in treatment (Bart, 2012). Several meta-analyses and clinical trials support the beneficial outcomes of methadone use over placebo or no-medication approaches for OUD. These include a lowering of illicit drug use, increased treatment retention, and decreased cases of relapse (Sees, Delucchi
Methadone is a slow-acting full opioid agonist. Binding to the body’s opioid receptors, the gradual and mild onset of the drug dampens the euphoria achieved by illicit opioid use as well as reduces the withdrawal symptoms and drug cravings (SAMHSA, 2018). Long term maintenance treatment with methadone is used in MAT. This treatment works to induce a higher level of opioid tolerance than that of street drugs. By increasing opioid tolerance, daily methadone doses can then attenuate the response to short-term opioids like heroin and ultimately extinguish the cravings through loss of the reinforcing euphoric drug highs originating from the large release of dopamine from the VTA (Bell, 2014). Methadone maintenance is often labeled as the replacement of an illegally used opiate for a legal opiate, this is untrue for several reasons. The use of illicit opioids requires an escalating dosage that becomes problematic for people who become addicted, but once a stabilization dose is achieved with methadone, a dose high enough to produce a greater tolerance than prior illicit drug tolerance, there is rarely a need for increased dosage (Bart, 2012). In addition, methadone binds to approximately 30% of opioid receptors when stabilized which leaves the remaining receptors free to execute the normal pain messaging, reward, and mood in the body (Bart, 2012). Methadone for opioid addiction is a daily treatment administered orally in liquid, tablet, or dispersible tablet formulation and it is only available at certified opioid treatment programs. The most well-studied medication in MAT, methadone is strongly evidenced and a well-established aid in OUD treatment, however other medications that act on the opioid receptors in different ways are also legitimate options in treatment.

**Buprenorphine**

With similar pharmacology to methadone, buprenorphine is a partial opioid agonist approved by the FDA for use within MAT for OUD. The partial agonist binds to the body’s opioid receptors but does not produce the same effect as a full agonist like methadone. Buprenorphine binds to and activates opioid receptors, but instead of a full response it induces a partial or weakened opioid response (Mattick, 2014). Due to its high receptor affinity, buprenorphine will bind for longer periods of time than opioids of lower affinity such as heroin and other problematic opioids involved in OUD (Mattick, 2015; SAMHSA 2018). In addition, there is a decreased disposition for tolerance when using buprenorphine than when using opioids like heroin or oxycodone. Buprenorphine takes a longer time to dissipate having a steadier effect on the receptors (Kosten & George, 2002). Like methadone, buprenorphine is similarly capable of blunting the dopamine-driven euphoric effects of illicit opioids. Its binding to the body’s opioid receptors decreases drug cravings and withdrawal effects. However, unlike methadone, which has an easy induction following active drug use, a patient must be in mild to moderate withdrawal from illicit opioids to begin taking buprenorphine or there is a chance of overdose (Kosten & George, 2002). This is a drawback as it may deter people currently addicted to opioids; they will most likely experience withdrawal symptoms in addition to the urge to continue illicit opioid use before starting their dosage of buprenorphine. Buprenorphine can be administered orally or as a long-acting injection allowing for flexibility of treatment delivery (Mattick, 2014). The literature surrounding buprenorphine and its safety, as well as its effectiveness, in OUD treatment is less extensive than that of methadone; however, there is substantial
evidence of its ability to impact outcomes, including improving treatment adherence and lowering illicit drug use (Bart, 2012; Mattick, Breen, Kimber & Davoli, 2014). MAT could benefit from more extensive research into buprenorphine in the treatment of opioid addiction as more supportive evidence can increase the security regarding the drugs' safety and effectiveness over placebo or no-medication approaches. Additionally, a larger body of literature surrounding buprenorphine in OUD treatment can be compared and integrated with the literature on methadone, potentially helping to identify traits in individual patients that make one drug more successful in treatment than the other.

**Naltrexone**

Naltrexone differs from the MAT drugs methadone and buprenorphine as it is an opioid antagonist. It is also the most expensive of the three FDA approved MAT drugs, making it more difficult for many patients to afford (ASAM, 2013). Naltrexone can be administered orally every 4 weeks or through an intramuscularly extended release formulation (Bart, 2012). As an antagonist, naltrexone blocks the effects of illicit opioids if they are used to aid in the prevention of relapse. Naltrexone does not activate the opioid receptors, like methadone and buprenorphine do, but instead blocks their activation. Therefore, the drug exerts no opioid response effects such as drowsiness or euphoric feeling, but also means that the drug will not prevent withdrawal symptoms and may even precipitate withdrawal in patients who are still physically dependent on opioids making its induction more difficult (Bart, 2012). Due to this reason naltrexone is often less used in many OUD cases (ASAM, 2015). Although naltrexone is not appropriate for use in detoxification, it is an option for the treatment of opioid addiction in motivated individuals who are already abstinent from opioids (Dugoush & others, 2016). Naltrexone will not show up in drug tests like the other MAT drugs and is often regarded with less stigma (ASAM, 2013). In the literature it is the least studied of the three drugs but has been significantly evidenced as more effective than placebo in lowering illicit drug use and sustaining abstinence (Comer, 2006; Carroll 2001).

**Research on MAT Medication**

More research is needed to compare the advantages of agonists and antagonists for the treatment of opioid use disorder. Current literature supports all three MAT medications, methadone, buprenorphine, and naltrexone, as superior to no treatment in opioid use disorder.

More information on their advantages and disadvantages in individuals, especially in individuals apart of special populations such as cases of comorbidity, pregnant women, or chronic pain patients, is needed to make proper decisions when faced with the choice between MAT medications. OUD patients are all unique, and the flexibility of choice in MAT medications makes the treatment more personalized and an effective approach to managing the chronic disease.

**MAT Medication Improves Patient Outcomes**

The importance of treating OUD with medication can be seen in studies looking at patient treatment outcomes. The medications that are used in MAT help reduce withdrawal symptoms and/or persistent drug cravings. By attaching to the brain opioid receptors, these drugs can help patients maintain long-term abstinence from the harmful opioid dependence as well as push through the short-term withdrawal agony without giving into a relapse.
Withdrawal is the primary driver behind continued drug use acting as a negative reinforcer for patients with addiction (Bart, 2012; Bell, 2014). Removing this reinforcer of drug use is possible with the medications used in MAT as they can lessen the effects of withdrawal and therefore reduce patients’ drives to repeat drug use in order to avoid withdrawal symptoms. Treatment adherence and relapse rates are predictive of medicine’s impact on opioid addicted individuals and are two significant markers of effectiveness in treatment outcome studies. A better adherence to treatment and lower risk of relapse both lessens the chance of a dangerous overdose in recovery patients and strengthens patient's ability to achieve a long-term abstinence. The meta-analysis done by Mattick and colleagues (2014) looked at the recovery of heroin addicts by comparing placebo medication outcomes with buprenorphine as well as methadone treatment outcomes in individuals. This meta-analysis pulled data from two large studies, done by Ling (1998) and by Johnston (1995), concluding with evidence that buprenorphine as well as methadone were superior to a placebo medication in terms of patient retention and the lowering of heroin relapse. (Mattick et al., 2014). Ultimately, this analysis shows the key impact of medicine on the influential aspects of recovery that prevent relapse and overdose. Other studies done on short-term treatment outcomes using placebos support this noticeable increase in patient retention for treatments involving methadone versus no medication (Sees, Delucchi & Masson, 2000). This study done with methadone also reflects lower rates of relapse and less overdose deaths in the outcomes of the medication-based treatments than in the placebo treatments.

The patients without medication in short-term studies struggle to continue in the recovery process and abstain from their prior abuse of illicit or prescription opioids. Fewer long-term studies on treatment outcomes involving opioids have been performed, showing a weak point in the literature. However, despite the lack of volume, one year-long study done by Kakko in 2003 focused on buprenorphine assisted treatment in relation to a placebo control. Similar to the short-term studies, their results and conclusions supported the critical difference medication makes in OUD treatment. The placebo group had a shocking 0% retention rate while the group being treated with buprenorphine maintained 75% of its population. (Kakko, et al., 2003). Additionally, the placebo group notably reported “massive heroin cravings” when trigger stimuli, consisting of personal environmental or emotional cues, were discussed with them. Meanwhile, the medicated group did not report these same cravings, reflecting a massive difference in the drug-seeking behavior that places recovering addicts at risk during treatment (Kakko, et al., 2003). Easing withdrawal symptoms that occur when stopping dangerous opioid use and abuse as well as helping manage the longstanding and persistent cravings to return to the drug are important differences medication can make for an individual being treated for OUD (Leshner, 1997).

Studies done on the clinical application of sustained release naltrexone for the treatment of opioid addiction after detoxification are also a part of the literature supporting medication over no medication approaches to OUD. An evaluation of treatment outcomes using naltrexone maintenance versus a placebo or no medication treatment reveals that in 60 heroin-addicted results, sustained release naltrexone significantly increased treatment retention rate as well as lowered illicit drug use (Comer, 2006).
The current medications used in MAT methods, buprenorphine, methadone, and naltrexone, are key players in the backbone of MAT effectiveness. The medications used in MAT are crucial to the treatment’s beneficial outcomes, therefore, a patient’s access to these medications can predict her/his ability to successfully recover. Expanded availability to buprenorphine, methadone, and naltrexone will make powerful contributions to the impact of MAT. Therefore, additional research on each drug interaction and relative effectiveness in relation to the different types of psychotherapy can provide further improvements for MAT used in the setting of OUD.

Psychotherapy in MAT

Psychotherapies Used in MAT

Psychotherapy in MAT is diverse in its options and covers a broad spectrum of psychosocial interventions that are applied as ancillary therapy in the drug-based treatments of opioid dependence. Cognitive behavioral therapy (CBT) and contingency management (CM) are the most common and recommended forms of therapeutic intervention for opioid addiction (Dugosh, 2016; SAMHSA, 2018). Other forms of evidence based psychosocial interventions used in MAT are motivational enhancement therapy, community reinforcement, and a 12-step facilitation program (SAMHSA, 2018). The treatment options vary, however, they all contain common therapeutic goals: to modify underlying processes that maintain or reinforce illicit opioid use behavior, to encourage medication engagement, and to treat any comorbid psychiatric disorders that complicate OUD or act as a trigger for relapse (ASAM, 2015).

Psychotherapies and Their Effectiveness in MAT

The treatment of opioid abuse with an FDA-approved medication has been shown to provide superior outcomes when combined with effective, evidence-based counseling (McLellan, 1993). However, the literature on the importance of the psychosocial aspect of MAT is diverse in its conclusions as some data has indicated no difference outcomes of patients provided with psychosocial interventions in addition to medication-based treatment (Bart, 2012). However, these contradicting studies that have found psychotherapeutic interventions to have positive influences on outcomes above medication alone have significant limitations and possible errors in execution. Further research that focuses solely on the impact of psychosocial therapies on OUD is essential as most studies are not directly focused on this issue, making the results on psychotherapy less clear.

Dugosh et al. summarizes the results of 14 studies looking at methadone maintenance in combination with psychosocial therapies (Dugosh, 2016). Twelve of the 14 studies showed better outcomes in treatment retention and illicit opioid abstinence for patients who received a psychosocial intervention including CBT, CM, or general counseling along with methadone as compared to methadone alone (Dugosh, 2016). Looking specifically at CBT interventions in combination with methadone medication, one of these studies recorded a significant decrease in drug use and psychiatric symptoms in the treatment group consisting of CBT and methadone versus the group involved in standard drug counseling with methadone (Woody, 1983). This evidence suggests that psychotherapies provide additional benefits to OUD patients taking methadone. There are several studies that have examined psychosocial treatment with methadone maintenance therapy, but a
gap in the literature exists in regard to psychosocial treatment with buprenorphine and especially with naltrexone treatment.

The outcomes of methadone in conjunction with psychotherapies are better studied than that of the same therapies in conjunction with buprenorphine. This deficiency in buprenorphine-based studies regarding the impact of psychotherapies as well as ineffectual and poorly regulated methods of psychosocial therapy delivery in some of the existing studies is a limitation of the literature that could benefit from more specific and regulated research. Nonetheless, there is evidence from studies pointing towards psychotherapy’s additive value to buprenorphine treatments. In one long-term study that showed buprenorphine superior to placebo, there was an inclusion of intensive psychosocial treatment that played into the highly effective and safe treatment described (Kakko, et al., 2003). Buprenorphine plus CBT achieved a 75% one-year retention which was superior to the 0% one-year retention in the placebo plus CBT group. In their conclusion, the authors stated that buprenorphine with psychosocial treatment is a beneficial treatment for opioid-dependent patients. This study reported that the impact of the psychosocial support structure on the effectiveness of the combined treatment is present in the substantial amount of inpatient days reported in the buprenorphine group. This conclusion is limited as the study did not focus on the isolated influence of psychotherapy on treatment outcomes, again reflecting the need for more focused research. Dugosh et al. included eight studies involving buprenorphine in his analysis of psychotherapies and their impact on treatment. Three of these studies showed positive effects of the psychosocial intervention, including CBT, community reinforcement, and family counseling (Dogush, 2016). However, this evidence is not as strong as it is for methadone in conjunction to psychotherapies as over half of the studies found no additional benefit of psychotherapy on outcomes beyond the medications.

There are very few studies with conclusive evidence regarding naltrexone paired with psychosocial therapies; however, one study compares standard naloxone treatment to the same treatment enhanced with voucher-based CM. In this study CM was associated with an increased treatment retention and a reduction in opioid use versus the standard treatment (Carroll et al., 2001). Studies considering naltrexone are even more scarce than that of buprenorphine, reflecting a neglect in the literature in assessing the psychosocial therapy’s impact on this medication that is used in MAT methods.

Psychotherapies, specifically CBT and CM, have been evidenced in studies including all three MAT medications to positively impact patient outcomes through increased treatment adherence, and a reduction in illicit opioid use. Larger amounts of focused research are needed in this area as it will be crucial in portraying psychotherapies’ value in each type of medication used in MAT as well as in the determination of which MAT medications and psychosocial therapies combinations work best for different subsets of patients. The variation of psychotherapies used in MAT positively provides patients with options making the personalized treatment of OUD easier. However, there is little information on how each form of counseling interacts with medications during treatment (Bart 2012). A more effective and efficient treatment can be implemented following the pursuit of more definitive information surrounding each of the psychotherapy intervention types as well as the way in which they interact with each of the three FDA approved medications used in MAT.
Flexible Application of MAT

There is no one size fits all approach to OUD treatment (SAMHSA, 2018). In a chronic disease there is a greater demand for individualization of treatment, as it is often long-term and more difficult to manage than a disease with a definite cure. MAT, as a combined approach of psychosocial therapy supported with medication, creates a well-rounded treatment for OUD patients that can be customized to fit the unique needs of individuals. With multiple effective options available, the type of MAT drug along with the type of psychotherapy chosen in MAT methods can be tailored to each patient and adjusted throughout treatment maintenance. More research into the best and most effective combinations of these two complementary treatment approaches in MAT is needed for better health outcomes. 47% of the sample population of 716 OUD patients were documented with psychiatric comorbidities. Psychiatric comorbidity was assessed as specifically more prevalent and severe in patients with OUD than in the general population (Brooner, 1997). These special populations can especially benefit from the customizable nature of MAT methods. Pregnant women are one example of a subpopulation that the flexibility of MAT aids. Medical risks linked with OUD are similar for both pregnant and nonpregnant women; however, OUD carries additional risks for pregnant women regarding their child’s health and the process of childbirth (American College of Obstetricians and Gynecologists, 2017). The use of methadone is accepted as the standard of care for use during a pregnancy as it has been found to be the least harmful to pregnancy (ASAM, 2015). Specific doses of methadone, or buprenorphine, throughout the terms of pregnancy are required as increased metabolism and blood circulation occur (Wolff, 2015). The variation of medication dosage in addition to specialized forms of psychotherapy as a response to the subpopulation pregnancy in OUD display the flexibility of MAT and the way the treatment can be adapted to best fit individual patients (ASAM, 2015).

Another subgroup of OUD patient is those with chronic pain. The occurrence of chronic pain patients with OUD is common as illicit or nonmedical prescription opioids can reduce many of the symptoms of chronic pain. Opioid agonists, like methadone or buprenorphine, are beneficial options within the MAT method to these OUD patients who also have chronic pain; however, antagonist like naltrexone are not as beneficial to these populations. Both methadone and buprenorphine have analgesic effects that can reduce chronic pain without reinforcing the abnormal brain functioning of opioid addiction. Therefore, the transition to opioid agonist treatments can help co-manage pain and opioid use disorders (ASAM, 2015). The variation of psychotherapies available is also key to MAT’s flexibility and has a notable importance in relation to this population’s comorbid condition. With several options ranging in duration, and intensity as well as in approach, the psychotherapies within MAT provide an essential choice for patients in OUD treatment.

Co-occurring psychiatric disorders are common among people diagnosed with OUD (ASAM, 2015). Epidemiological studies have concluded that there is a higher prevalence of substance use among people with psychiatric disorders than in the general population (Brooner, 1997). In terms of medication, the once monthly injections of extended-release, injectable naltrexone are beneficial to some of these patients with a co-occurring psychiatric disorder as their comorbidity may make it more difficult for them to adhere to daily
dosing (ASAM, 2015). Additionally, the outcome benefits of CBT, counseling, or other psychotherapies in MAT make a crucial difference in the long-term recovery for these individuals (SAMHSA, 2018). These are only a few examples of how MAT’s flexibility within treatment is beneficial in personalized care, making it the best strategy to approaching OUD, which is a chronic illness with which long-term and patient-centered care is essential.

**Access Limitations on MAT**

OUD is a difficult diagnosis to receive as the disease is difficult to treat, but MAT offers an effective and manageable option for these patients to function normally in their everyday life and avoid serious and detrimental effects of opioid addiction. A long-term addiction to opioids can produce brain damage, liver damage, physical dependence, insomnia, and other behavioral problems, which can impact the individual socially (CDC, 2018). Treatment with medication and psychosocial support is important in helping individuals with an opioid addiction improve their life, and MAT is a solidly evidence-based approach currently making a difference for those that can access it. Although MAT has been evidenced to positively influence patient outcomes, the medications involved have been severely underutilized. As shown by SAMHSA’s 2016 National Survey of Treatment Centers in which only 27 percent of all treatment facilities provided buprenorphine services and only 21 percent of the facilities provided extended-release naltrexone treatment (SAMHSA, 2016). Significant limitations rooted in geography, affordability, and social acceptance are evident in the treatment of OUD. The expansion of these medications and MAT practices are therefore a practical and necessary step in fixing the opioid crisis that has been rapidly growing across the globe and, specifically, within the United States.

A significant step in this expansion is improving access to MAT medication. Methadone treatment is only available at certified opioid treatment programs as the setting in which the medication can be dispensed is regulated by state and federal laws (42 CFR 8.12 - Federal Opioid Treatment Standards.). This restriction on the attainment of methadone provides substantial barriers of access for many patients. Most administrations are required to be on-site, making location and cost of transportation a common issue amongst patients. Additionally, there are often long waiting lists for enrollment in these opioid treatment programs, creating a problem for people who may need more immediate help or cannot commit to a long waiting period (ASAM, 2015). Buprenorphine prescriptions are available outside of opioid treatment programs, but they can only be written by certified physicians which are scarce, especially in many rural areas, making location an obstacle in its availability. More than 40% of counties in the United States do not have a single buprenorphine-waivered physician (ASAM, 2013). Nevertheless, buprenorphine is available as a tablet or implant that can be prescribed in an office-based setting, making its daily administration often less time and money consuming than methadone treatment (ASAM, 2015). An effort to increase the number of waivered physicians would maximize buprenorphine availability, allowing it to change more patients’ lives across the United States. This could be done by providing incentives to physicians to earn and more importantly use this certificate. Similarly, an increase in the number of opioid treatment program centers can help improve access to methadone medications.

Affordability creates an obstacle for many OUD patients looking to recover (U. S
Department of Defense, 2017). Methadone treatment, assuming the required daily visits and psychosocial support costs $126.00 per week or $6,552.00 per year while buprenorphine treatment including the medication and bi-weekly visits cost around $115.00 per week or $5,980.00 per year. The most financially limited medication is naltrexone with medication and its administration costs about $1,176.50 per month or $14,112.00 per year. Insurance can help aid financially, however, most plans only cover specific medications and additionally specific plans place caps on the number of doses and prescription refills a patient can receive financial support for (Lynne, 2015). The MAT medications are expensive and can be difficult for many patients to afford continuously, especially as the treatment is intended to be long-term due to the chronic nature of the disease and its treatment. Effort to improve healthcare plans surrounding the coverage of these medications as well as an increase of the production of these medications can help lower these costs and make the treatment more widely accessible to patients of all economic statuses.

Another issue in access comes in the form of social stigma. Many OUD patients are deterred from using methadone or buprenorphine as they both show up on drug tests (ASAM, 2013). The stigma of addiction and these drug’s appearance in tests may create issues in a patient’s personal life as well as embarrassment in hiring procedures with jobs that require drug testing. In contrast, naltrexone does not show up in drug testing making it a more appealing option to some individuals (ASAM, 2013). Increasing public education on substance abuse and OUD can potentially decrease the negative connotations of the disease.

Lastly, a large limitation specific to naltrexone is the difficulty of its induction as patients must go through withdrawal and a period of abstinence from illicit drugs before their first dose. On average, 40% of patients drop out during the first month of naltrexone treatment and 60% drop out by 3 months (Carroll, 2001). Naltrexone will produce an immediate opioid withdrawal in patients who are not fully detoxified from prior opioid use (ASAM, 2013). This limitation of naltrexone is important in the consideration of which individuals are best suited for the choice of this drug in recovery.

Conclusion

With strong evidence in support of MAT and the effectiveness of its methods, an increase in treatment access as well as a more optimal delivery of the treatment’s personalized nature could have a significant impact on public health. Many health organizations such as SAMHSA, ASAM, and the FDA support MAT methods as the best strategy and continue to push for further implementation in OUD cases. As a chronic brain disease, the alteration of the brain’s natural opioid receptors in chronic abuse of opioids significantly impact a patient’s normal brain state and therefore produce a dependence that dictates the daily lives of OUD patients. The current impact on people of all ages and backgrounds raises noticeable public health concern. Addressing these abnormalities of the impacted brain structures and their functioning with MAT is a crucial step in decreasing overall opioid overdose deaths and aiding in the sustained recovery of individuals suffering with OUD. MAT is an effective treatment with flexible capabilities, but it can make even more significant impacts with informed improvements that can come from further research and clinical trials. Additionally, an expansion of the treatment and its accessibility can help aid in
a national crisis that has resulted in numerous deaths and has negatively altered the lives of a large portion of our population.

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