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# The Effectiveness of Medication Assisted Treatment (MAT) Programs in Correctional Facilities: A Review of the Evidence and Recommendations

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# The Effectiveness of Medication Assisted Treatment (MAT) Programs in Correctional Facilities: A Review of the Evidence and Recommendations

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The Effectiveness of Medication Assisted Treatment (MAT) Programs in Correctional Facilities: A Review of the Evidence and Recommendations

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I dedicate this thesis to my mother, Rose Phenia Nerelus.

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# The Effectiveness of Medication Assisted Treatment (MAT) Programs in Correctional Facilities: Review of the Evidence and Recommendations

## Prevalence of Opioid Use Disorders (OUDs) in the United States

Since its emergence in the 1990s, the opioid epidemic continues to affect millions of Americans each year (Paulozzi, Budnitz, & Xi, 2006). In 2015, more than 20.5 million Americans were diagnosed with opioid use disorders (OUDs), 2 million of whom abused prescription pain relievers (L. Gowing, Farrell, Bornemann, Sullivan, & Ali, 2008). Every year, heroin, synthetic opioids, and prescription opioids account for most opioid overdose-related deaths, with prescription painkillers accounting for more than half of these incidents (Paulozzi, Budnitz, & Xi, 2006). Additionally, with more than 52,404 lethal drug overdoses in 2015, a drug-related overdose is now the leading cause of accidental death in the United States (Rudd et al., 2016). Between 2014 and 2015, the death rate from synthetic opioids other than methadone significantly increased by 72.2% (Rudd et al., 2016). Specifically, heroin-related overdose rates saw the second highest increase of 20.6% across all demographic groups, regions, and states (Rudd et al., 2016). Natural and semisynthetic opioid-related death rates increased by 2.6% while methadone death rates decreased by 9.1% (Rudd et al., 2016).

The prevalence of Opioid use disorder is particularly devastating in US prisons. While only 5% of the general population meet the criteria for substance use disorders, as many as 58% of state prisoners and 63% of sentenced jail inmates meet the criteria for drug dependence (Bronson et al., 2017). Among the 2.3 million people incarcerated in the U.S, more than 200,000 of them have opioid dependence (State & Population, 2018). This translates that approximately 24 to 36% of all individuals with Opioid Use Disorders (OUDs) involving heroin go to prison in the United States (Boutwell, Nijhawan, Zaller, & Rich, 2007).

Despite the high demand for opioid-substitution treatment in correctional settings, access to proper treatment in jail and prisons remains scarce (Bronson et al., 2017). The lack of proper treatment during incarceration is associated with negative health outcomes post-release (Bronson et al., 2017). In fact, during their transitions to their communities, former inmates are at higher risks of relapse, drug overdose, and more.

## The Post-Release Consequences of Improper Treatment for OUD during Incarceration

**Relapse:** Without proper substance use treatment, formerly incarcerated individuals face high rates of relapse to alcohol and illicit drugs post-release (Dolan et al., 2005; Dole et al., 1969; Farrell & Marsden, 2008; Favrod-Coune et al., 2013). In fact, during the first year after release, 85-90% of former inmates relapse to opioid use (Gordon et al., 2014). Merrall and colleagues (2010) suggested that formerly incarcerated individuals may experience high relapse rates post-release due to social isolation and loss of tolerance during prison. This highlights the importance of providing proper treatment to those with OUD during incarceration. Despite the high rate of relapse to heroin and other illicit drugs, inmates have limited to no access to proper treatment during incarceration (Bronson et al., 2017; Gordon et al., 2014; Merrall et al., 2010). Similarly, many of them remain untreated upon release (Dolan et al., 2007; Gordon et al., 2014; Stöver, Kastelic, & Pont, 2008).

**Overdose:** Individuals with OUDs who have been incarcerated also have the highest risk of a fatal opioid-related overdose of any subpopulation during community re-entry (Binswanger et al., 2007; Boutwell et al., 2007). A study assessing the risk of death among inmates soon after their release found that their adjusted risk for overdose-related death was 3.5 times that among state residents (Binswanger et al., 2007). Specifically, overdose-related incidents risks were 12-fold higher than would be expected in similar demographic groups

(Binswanger et al., 2012). With an adjusted relative risk of 129, overdose risk was the highest during the first few weeks after release (Binswanger et al., 2012). During the first two weeks, their adjusted risk of death was 12.7 times higher than other state residents (Binswanger et al., 2007).

In another study investigating all causes of mortality for formerly incarcerated individuals in Washington between 1999 and 2009, overdose was the leading cause of death (Binswanger, Blatchford, Mueller, & Stern, 2013). Overdose deaths in former prisoners accounted for approximately 8.3% of the overdose deaths recorded among individuals aged 15 to 84 years in the state of Washington between 2000 and 2009 (Binswanger et al., 2013).

**Infectious Disease Risk Behaviors.** Communities with the highest rate of heroin users simultaneously experience high rates of Hepatitis C (HCV) diagnoses ("Centers for Disease Control and Prevention, 2013). The rate of new HCV infection increased by 150% from 2010 to 2013 in communities with young drug users ("Centers for Disease Control and Prevention", 2013; Zibbell et al., 2015). Similarly, HCV prevalence ranges between 30-40% among prisoners in the United States (Center for Disease Control and Prevention, 2003). In prisons, the rate of HIV and AIDS among those with substance use disorders is 3 to 4 times greater than the rates found in the general population. Similarly, relapse to opioid and other illicit drugs post-release is associated with high rates of mortality and poor HCV and HIV treatment outcomes (Curcio, Franco, Topa, & Baldassarre, 2011; Dole et al., 1969; Farrell & Marsden, 2008; Favrod-Coune et al., 2013; Fazel, Bains, & Doll, 2006; Friedmann et al., 2012; Spaulding et al., 2009).Yet, fewer than 33% of individuals who use drugs receive proper substance use, HCV, and HIV care (Zibbell et al., 2015).

## Methadone and Buprenorphine for Medication Assisted Treatment (MAT)

Many drugs have been extensively used and studied for the treatment of OUDs in criminal justice settings (Nunn et al., 2009). Medications used to treat opioid dependence include methadone and buprenorphine, with methadone maintenance therapy (MMT) being used by the majority of correctional facilities that offer Medication-assisted treatment for OUD (Marshall et al., 2017; Nunn et al., 2009).

**Methadone.** Methadone is a full mu opioid agonist used to treat heroin and other opioid dependence (Marshall et al., 2017). According to Marshall and colleagues (2017), methadone is an effective maintenance therapy option and a detoxification agent due to its slow onset of action and extended half-life ranging from 24 to 36 hours. Additionally, methadone treatment has been associated with positive health outcomes, including increased treatment retention and reduction in IV drug use, criminal activity, HIV risk behaviors, and drug overdose-related mortality (Dole et al., 1969; L. R. Gowing, Farrell, Bornemann, Sullivan, & Ali, 2006; Gronbladh, Ohlund, & Gunne, 1990; Newman & Whitehill, 1979)**.** Nevertheless, a national report in 2007 showed that MMT was available to less than 20% of Americans with opioid dependence (Cunningham, Kunins, Roose, Elam, & Sohler, 2007).

Since the 1970s, many countries, including Canada, France, the Netherlands, Australia, and Spain, started implementing the use of methadone-maintenance therapy (MMT) for the treatment of OUD in corrections facilities (Dolan et al., 2003; Haig, 2003; Hall, Ward, & Mattick, 1993; Langendam et al., 1998; Perez de los Cobos et al., 2004). To date, the United States has more than 3200 county jails and 1800 state and federal prisons (Lee et al., 2015; Vestal, 2016). Unfortunately, in 2008, less than 0.1% of incarcerated individuals with OUD received any form of medication-assisted treatment (Larney & Dolan, 2009).

Many corrections agencies prefer the use of non-medicated approaches, such as counseling for forced withdrawal, to treat opioid use disorder among incarcerated individuals (Brinkley-Rubinstein et al., 2018). This is mostly due to the lack of resources in these facilities, security concerns regarding proper medication dispersion, stigma associated with MMT, and the lack of knowledge about the effectiveness of methadone for medication-assisted treatment (Brinkley-Rubinstein et al., 2018; Gordon et al., 2014; Nunn et al., 2009). However, MMT has been shown to be an effective, evidence-based approach to address opioid use disorder in the prison population and improve post-release health outcomes of inmates (Connock et al., 2007; Degenhardt & Hall, 2012; Kinlock, Gordon, Schwartz, Fitzgerald, & O'Grady, 2009; Mattick, Breen, Kimber, & Davoli, 2009; McKenzie et al., 2012; Rich et al., 2015).

**Buprenorphine.** Buprenorphine is a synthetic opioid used as an agonist substitution treatment for pain and opioid dependence (Kumar & Saadabadi, 2019). Buprenorphine for medication-assisted treatment (MAT) has been extensively studied since the 1970s and is an effective and safe opiate dependence psychotherapy (Wesson & Ling, 2003). The Drug Addiction Treatment Act of 2000 (DATA 2000) allowed primary care physicians to become qualified to prescribe buprenorphine in settings other than an opioid treatment program (OTP). Nevertheless, demand for treatment continues to outgrow the number of DATA-waived providers allowed and willing to prescribe buprenorphine for MAT (Wesson & Ling, 2003).

Buprenorphine could be an alternative to methadone maintenance treatment for opioid use disorders during incarceration (Magura et al., 2009; Vocci et al., 2015). Unlike methadone, the use of buprenorphine for MAT has less associated stigma, fewer regulations in

the United States, can be administered on alternate days, and has been shown to facilitate entry in community-based MAT programs (Dasgupta et al., 2010; Lee et al., 2015; Magura et al., 2009).

## Benefits of Providing Buprenorphine for MAT in Correctional Settings

Benefits of Buprenorphine for MAT in Correctional Settings are a multitude. Findings from an observational study conducted in England suggested that the implementation of prison-based buprenorphine for opioid substitution therapy may reduce drug-related mortality rates by 85% in the first month after release (Marsden et al., 2017). Making substance abuse treatment available to those in need in the criminal justice system could significantly lower the demands for drugs and reduce the rates of drug overdose-related deaths (Pizzicato, Drake, Domer-Shank, Johnson, & Viner, 2018).

Additionally, findings from a retrospective study suggest that compared to patients who do not adhere to buprenorphine treatment, patients retained in buprenorphine treatment have higher likelihood to gain access to HCV treatment (22.4% vs. 8.5%, $p < 0.05$), initiate treatment (9.2% vs. 6.4%, $p = 0.6$), and achieve positive HCV- related health outcomes (40.8% in the retained group vs. 21.3% not retained, $p<0.05$) and (Norton et al., 2017). The use of a multidisciplinary approach that incorporates substance use care, such as medication-assisted treatment, and HCV treatment may lead to better health outcomes in individuals with substance use disorders who are co-infected with HCV (Bruggmann & Litwin, 2013; Robaeys et al., 2013; Springer, Qiu, Saber-Tehrani, & Altice, 2012). Similarly, international guidelines support the integration of methadone for medication-assisted treatment with HIV- treatment (Martin & Wang, 2013). Despite the evidence of the efficacy of integrating the use of opioid therapy treatment with HIV and HCV care to achieve maximal viral suppression in prisoners

infected with HIV, few correctional facilities have implemented the use of integrated HIV or HCV treatment and MAT (Springer et al., 2012).

Medication-assisted treatment (MAT) can help improve the health outcomes of individuals with OUD during their transition period after release (Magura et al., 2009; Norton et al., 2017). Yet, access to MAT remains scarce in jails and prisons (Bronson et al., 2017). In fact, only 28% of prisoners and 22% of jail inmates who met the criteria for severe substance use disorders received proper medical treatment (Bronson et al., 2017). The objective of this study is to provide a narrative review of evidence on the long-term, post-release outcomes of implementing pre-release buprenorphine or methadone for MAT in correctional settings. Specifically, we will evaluate the effectiveness of the initiation of buprenorphine and methadone for MAT during incarceration in 1) increasing the likelihood of treatment continuation after release and 2) reducing the rate of relapse and overdose deaths during the transitioning period.

## Methods

This study aims to answer the following question: "How can the implementation of medication-assisted treatment (MAT) programs in correctional settings improve the post-release health outcomes of individuals with opioid use disorders?" We hypothesize that the implementation of MAT in criminal justice settings can improve the health outcomes of individuals by increasing their likelihood of treatment continuation and decreasing their risk of relapse and drug-related overdose death upon release.

### Search Strategy

We searched PubMed and PsycINFO to identify studies published between 2009 and 2019 that evaluated the effectiveness of MAT in jails and prisons in the United States. To be

included in this analysis, studies must have a comparison group. Animal studies, cross-sectional studies, incomplete studies (pilot studies, preliminary reports), studies conducted in inpatient hospitals or residential rehabilitation facilities, and studies published prior to January 1, 2009, were excluded from this analysis.

Our search strategy included terms related to medical subject headings, correctional facilities, and MAT programs in various combinations. Additionally, we searched through reference lists of relevant articles for additional studies that were not included in our results when employed the first search strategy. Upon the removal of duplicated studies, the author independently reviewed titles and abstracts, followed by full-text screening, to identify relevant studies. Mendeley was used to organize publication records, identify duplicates, and find citations.

**Comparators**

This study includes 4 types of comparison studies: (1) studies comparing patients who received pre-release MAT treatment and those who received other types of intervention, (2) studies comparing patients who received pre-release MAT services and those who received treatment post-release, and (3) studies comparing different medications used for MAT (i.e. buprenorphine vs. methadone).

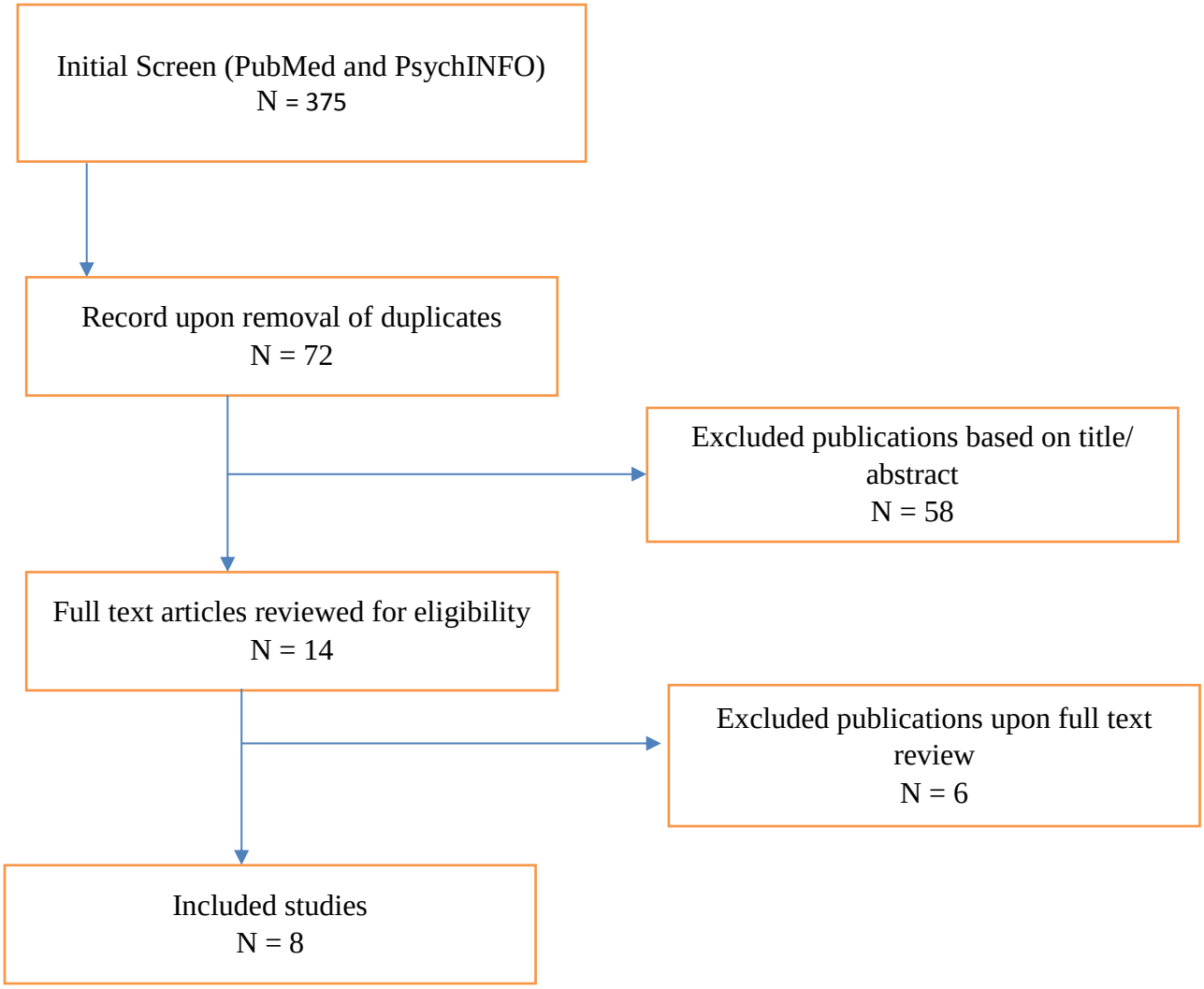


**Figure 1.** Literature Flow Diagram

## Results

Eight studies are summarized in table 1. All eight studies were randomized clinical trials (RCTs). Four were conducted in Rhode Island, two in Baltimore, one in Connecticut, and one in New York City. Treatment and comparisons were all drawn from incarcerated individuals with diagnosed opioid use disorders. Interventions involved the use of methadone maintenance treatment (four) and buprenorphine treatment (four). One study followed up with participants at one-month post-release; two at three months; four at six months; and three at twelve months post-release. Table 2 summarizes the evidence on the impact of each intervention on the post-release health outcomes of study participants. The table provides a synthesis of the studies per outcome with positive change or no effect. The evidence is consistent regarding retention in treatment post-release, relapse (drug use) and overdose. Inconsistent evidence was found regarding infectious disease risk behaviors and other outcomes, such as re-incarceration, criminal activity, visits to the emergency room, and hospital admissions.

## Methadone

### Treatment Continuation

Brinkley-Rubinstein and colleagues (2018) conducted a randomized clinical trial study in a combined prison and jail facility in Rhode Island to measure the long-term outcomes of methadone treatment during incarceration compared to forced withdrawal at 12 months post-release. Although not statistically significant, those who received MMT were more likely to engage in continuous MMT at 12 months (Brinkley-Rubinstein et al., 2018). Specifically, 43.6% of the methadone group continued MMT treatment compared to 38.8% of the forced withdrawal group (Brinkley-Rubinstein et al., 2018).

Another randomized clinical trial study assessed the efficacy of prison-initiated MMT compared to post-release community MMT or pre-release counseling with a passive referral for methadone treatment in the community after release (Kinlock et al., 2009). Individuals in counseling + methadone group reported a higher mean number of days enrolled in a community-based treatment compared to their counseling + transfer and counseling only groups (166 vs. 91.3 vs. 23.1 days, respectively). Additionally, the counseling methadone group individuals were more likely to remain in treatment for one year compared to the other two groups. Seventy percent of the methadone group remained in treatment for 365 days compared to 53.6% of the counseling and transfer group, and none of the counseling-only group (all ps< 0.01).

Similarly, a 3-arm randomized controlled trial study compared the long-term outcomes of initiating methadone treatment pre-release compared to post-release initiation of treatment (McKenzie et al., 2012). In this study, arm 1 consisted of individuals who initiated methadone pre-release and continued methadone treatment post-release with financial assistance, arm 2- were referred to a methadone program post-release with financial assistance, and arm 3 were referred to a methadone program, but were not offered financial assistance. In this study, 80% of arm 1 participants entered treatment within 30 days of release compared to 41% of arm 2 participants and 22% of arm 3 participants (p< 0.001).

Rich et al., (2015) conducted an open-label trial to compare the post-release outcomes of methadone during incarceration versus forced withdrawal from methadone. Participants assigned in the methadone group were more than twice as likely to return to community methadone clinic within the first-month post-release compared to those in the forced withdrawal group (97% vs. 77% respectively, p< 0.00001) (Rich et al., 2015). Methadone

participants were also more likely to attend methadone treatment after release. These participants were 7 times more likely to get methadone treatment post-release than those who underwent forced withdrawal from methadone (Rich et al., 2015).

**Relapse and Drug-Overdose Related Mortality**

Brinkley-Rubinstein and colleagues (2018) also observed a significant difference in drug use among the methadone group. Individuals who received MMT on the day before release were significantly less likely to report using heroin ($p= 0.0467$) and injecting other illicit drugs ($p= 0.0033$) in the past 30 days at 12-month follow-up compared to those who were not dosed with methadone the day before release (Brinkley-Rubinstein et al., 2018). Additionally, the group dosed with methadone the day before release were less likely to experience non-fatal overdose ($p= 0.0390$).

In Kinlock et al., (2009) the group who received counseling + methadone treatment in prison was significantly less likely to be opioid-positive at 12 months post-release compared to the counseling plus a transfer to a community methadone program and the counseling-only groups ($p= 0.008$). Specifically, 65.6% of counseling only group were opioid-positive at the 12 month follow-up period compared to 48.7% counseling plus transfer group, and 25.0% of counseling + methadone group ($p= 0.002$). There were also statistically significant differences in urine cocaine test results among the 3 groups. Seventy-one percent of the counseling-only group tested positive for cocaine at 12 months compared to 66.6% counseling+ transfer group, and 43.2% of the counseling + methadone group ($ps < 0.05$).

In McKenzie et al., 2012, 14% of methadone pre-release participants (arm 1) relapsed to heroin use at 6-month follow-up compared to 56% of referred MMT participants with payment (arm 2) and 44% of MMT referral only participants (arm 3) ($p= 0.008$). Additionally,

arm 1 participants were statistically significantly less likely to report cocaine use (19%) compared to arm 2 (41%) and arm 3 (33%) participants (p= 0.06).

In Rich and colleagues (2015), 8% of the continued methadone group reported opioid and 64% reported other drug use at 1-month post-release. In the forced withdrawal group, 18% reported opioid use while 76% reported using other drugs (P= 0.033 for opioid use and 0.065 for other drug use) (Rich et al., 2015).

### Infectious Diseases Transmission

No studies reported data on the impact of methadone maintenance treatment (MMT) in correctional settings on HIV or HCV incidence. Rubenstein et al., (2018) found no statistically significant differences for transactional sex and other HIV risk behaviors among the 3 study groups. Rich et al., (2015) found that the methadone group was less likely to report the use of injectable illegal drugs (17% vs. 32%, p= 0.016). Kinlock et al., (2009) reported one death from AIDS in the counseling + methadone group. It is unclear whether the individual became infected with AIDS prior to or after incarceration.

## Buprenorphine

### Treatment Continuation

Magura et al., 2009 found that pre-release initiation of buprenorphine for substance use treatment is more effective than other treatments when it comes to increasing the likelihood of treatment continuation after release. In this study, researchers wanted to examine if the use of buprenorphine can be as effective as methadone for MAT in a jail setting. At entry, ninety- three percent of buprenorphine patients stated their intention to continue treatment after release compared to 44% of those in the methadone group ($p < 0.001$). Although not statistically significant, participants in the buprenorphine were also more likely

to complete their treatment in jail compared to those in the methadone group (82% vs. 75%) (Magura et al., 2009).

Additionally, the buprenorphine group reported to their assigned post-release treatment in the community after release more often than the methadone group (48% vs. 14%, $p< 0.001$) (Magura et al., 2009). The buprenorphine group was also more likely to attend their medication-assisted treatment sessions than methadone patients (48% vs. 23%, $p< 0.005$). Interestingly, five of the 56 methadone patients chose to receive buprenorphine treatment rather than methadone treatment after release whereas none of the buprenorphine patients transferred to a methadone provider after release. The authors believe that buprenorphine treatment may have been more feasible for those individuals who transferred from the methadone group. Unlike methadone programs, which are highly regulated, buprenorphine programs can be provided in flexible clinic- and office-based settings, which may increase the rate of patients' reporting for treatment (Magura et al., 2009).

Gordon et al., (2017) examined the long-term, post-release outcomes among prisoners who participated in a randomized clinical trial study to assess the impacts of implementing buprenorphine treatment pre-release vs. post-release from prison. They found that former prisoners who initiated buprenorphine treatment in prison had a higher mean number of days retained in treatment upon release compared to the control group, who received treatment after release. The pre-release group had a mean number of 65.9 days while the control group only reported 21.8 days in treatment ($p= 0.005$) (Gordon et al., 2017).

Zaller and colleagues (2013) found that initiating buprenorphine prior to release increased linkage to treatment and attendance to treatment appointments post-release. Ninety-two percent of participants who started buprenorphine treatment in prison were linked to care

in their community. Eighty-three percent of them remained in treatment for 6 months, and reported an average of 3.9 days to their first appointment, a mean of 20.3 weeks, and a median of 24 weeks in treatment (Zaller et al., 2013). Among the control group (initiated buprenorphine after release), 73% were referred to buprenorphine treatment in the community. Among them, 78% linked to care in the community and 34% remained in care for 6 months. Those who remained in treatment reported a mean of 9.2 days to their first appointment and remained in treatment for 13.2 weeks (Zaller et al., 2013). Specifically, at 24 weeks, 91% of participants in the pre-release group remained in treatment while 34% of the post-release individuals who initiated treatment after release did so ($p= 0.005$).

**Relapse and Drug-Overdose Related Mortality**

Zaller et al., (2013) also found that pre-release initiation of buprenorphine decreased opiate use and overdose-related incidents upon release. None of the participants who initiated buprenorphine treatment in prison reported the use of opiate, drug injection or an overdose at the 6 months post-release follow-up period. On the other hand, 23.1% of the post-release group reported heroin use ($p= 0.08$), 26.9% reported injecting drugs ($p= 0.05$), and 11.5% experienced a non-fatal overdose incident during their 6 months follow-up period ($p= 0.23$).

**Infectious Diseases Transmission**

No studies conducted between 2009 and 2019 investigated the effectiveness of integrating buprenorphine and HIV or HCV treatment to treat OUD and maintain maximal viral suppression during incarceration and after release from prison. However, a prospective study evaluated the efficacy of buprenorphine for MAT after release to sustain viral suppression among former inmates with HIV who were part of a clinical trial (Springer et al., 2012). Springer et al., (2012) found a positive association between enrollment in a

buprenorphine treatment program and maximal viral suppression (Springer et al., 2012). Individuals retained in buprenorphine treatment for 24 weeks were more likely to sustain maximal viral suppression (MVS) compared to those who received buprenorphine, but failed to remain in treatment for 24 weeks (OR= 4.32, p= 0.03) (Springer et al., 2012).

## Discussion

Both methadone and buprenorphine for medication-assisted treatment during incarceration are significantly associated with better treatment retention rates after release. Majority of the studies found better treatment retention outcomes post-release among both individuals who received buprenorphine or methadone during incarceration (Rubenstein et al., 2018; Kinlock et al., 2009; Magura et al., 2009; Gordon et al., 2017; Zaller et al., 2013; Rich et al., 2015). Access to medication-assisted treatment in correctional facilities may also be associated with reduced risks of drug use (Rubenstein et al., 2017; Kinlock et al., 2009; McKenzie et al., 2012; Zaller et al., 2013), drug-related overdose (Rubenstein et al., 2017), recidivism (Zaller et al., 2013), and HIV risk behaviors (Springer et al., 2012; Rich et al., 2015).

Evidence is lacking regarding the impacts of integrating medication-assisted treatment and HCV/ HIV care on the post-release incidence and HIV/ HCV-related risk behaviors among individuals previously incarcerated in the United States. None of the studies summarized implemented the integration of HIV or HCV care and MAT. However, Rich et al., (2015) and Springer et al., (2012) both found that retention in treatment post-release was positively associated with maximal viral suppression and lower risk in HIV- risk behaviors. Another systematic review suggested that providing medication-assisted treatment in correctional settings may reduce risk behaviors among individuals with OUD and reduce HIV

incidence post-release (L. Gowing et al., 2008).

**Gaps in Literature and Limitations**

Studies included in this analysis had important methodological limitations (refer to Table 2). Possible sources of bias include selection bias, social desirability bias, and lack of generalizability of findings. Studies conducted in Rhode Island recruited participants from a unified prison and jail system (Rubenstein et al., 2017; McKenzie et al., 2012; Zaller et al., 2013; Rich et al., 2015). This may have affected the generalizability of their findings. Similarly, most participants included in the summarized studies were males. Additionally, differential rates of follow-up and the use of self-reported data may have resulted in selection bias and social desirability bias. Previous studies have found that participants with poor outcomes are more likely to be lost to follow-up, which may result in overestimation of treatment benefits (Marco et al., 2013).

This review could not clarify several questions. There was insufficient evidence on the effectiveness of integrating MAT programs and HIV/ HCV care in correctional settings in reducing infectious disease risk behaviors and incidence post-release. None of the studies conducted a needs assessment with prisoners to identify protective and risk factors related to retention in treatment and other post-release outcomes. Further research is needed to evaluate the struggles that former inmates face during community re-entry that may affect their ability to continue treatment and achieve positive health outcomes.

**Ethical Consideration for MAT in Correctional facilities and Future Recommendations**

With over 2 million incarcerated individuals, the United States has an incarceration rate of 500 prisoners per 100,000 residents, the highest rate in the world since 2010 (Guerino, Harrison, Sabol, & Statisticians, 2011). Between 1980 and 2016, the number of individuals

imprisoned for drug offenses increased from 40,900 to 450,000 (State & Population, 2018). Despite the overrepresentation of individuals with OUD in correctional facilities, access to proper opioid substitution treatment, such as methadone or buprenorphine for MAT remains scarce (Connock et al., 2007; Friedmann et al., 2012; Mintzer et al., 2007).

According to the Court ruling in *Estelle v Gamble*, neglection of a prisoner's illness constitutes cruel and unusual punishment that violated the eighth amendment (Rosenfeld, 2016). Withholding treatment and care to those in need in the criminal justice system is morally and ethically questionable (Rosenfeld, 2016). Despite this ruling and the agreement that opioid use disorder is a disease, the quality of care to treat opioid use disorder in correctional facilities remains limited (Taxman, Perdoni, & Harrison, 2007). Less than 35 percent of courts in the United States permit the implementation of medication-assisted treatment programs in the prisons and jails (Allen, Wakeman, Cohen, & Rich, 2010).

**The Evidence is there, Now What?**

The evidence presented in this summary highlight the needs for and benefits of implementing MAT programs in correctional facilities to treat OUD and improve the post-release outcomes of individuals returning to their communities. However, one must consider many factors that may influence the effectiveness of implementing proper treatment options for incarcerated individuals with OUD. These factors include the cost of treatment during incarceration and post-release; individuals' treatment readiness; and their access to providers waived and willing to provide buprenorphine or methadone for medication-assisted treatment in their communities.

**Treatment Readiness and Social Support**

Factors that shape patients' readiness for change may influence treatment outcomes. Readiness, self-efficacy, expectation about therapy outcomes, satisfaction with treatment can have significant impacts on patients' health outcomes during and after substance use treatment (Flora and Stalikas, 2013). Flora and Stalikas (2013) defined treatment readiness as patients' ability to realize their dependence on substance as a problem and take the initiative to voluntarily enroll in treatment. Self-efficacy was measured as patients' trust in themselves that they can overcome addiction and attain successful health outcomes, such as retention in treatment and abstinence (Flora & Stakilas, 2013 ). Flora and Stakilas (2013) found that patients with previous treatment experience were more likely to recognize the seriousness of their addiction and remain in treatment. In fact, treatment readiness proved to be a significant predictor of remaining in treatment for at least 360 days (Flora & Stakilas, 2013).

Similar results were observed when assessing the impact of treatment readiness among patients in an opioid maintenance therapy program (Joe, Flynn, Broome, & Simpson, 2007). A 110% increase in retention was observed for each unit increase in the treatment readiness score reported by patients. Another study investigating factors that influence the outcomes of buprenorphine for MAT found that social and internalized stigma were both negatively associated with the ability to seek treatment and receptivity to treatment (Hewell, Vasquez, & Rivkin, 2017). When asked about this, respondents reported that others see addicts as "evil" (Hewell et al., 2017). As a result, individuals who are dependent on substances refrain from seeking the treatment that they need (Hewell et al., 2017). This highlights the need to change negative attitudes towards medication-assisted treatment on both a systemic and individual level. Given this evidence, implementing medication-assisted treatment programs in correctional facilities may increase individuals' treatment readiness for

post-release care. Future studies should assess the impact of implementing MAT programs during incarceration on individuals' self-internalized stigma towards substance use treatment and changes in their perception regarding receiving treatment upon release.

A social environment and support can also play a role in the treatment outcomes. Having recovery-oriented social support and not have a difficult living situation are both positively associated with retention of 90 days or more (Rudd et al., 2016). Furthermore, Rudd and colleagues reported that poor family relations, poly-drug use, and social environment that encourage drug use (having friends who also use substances) are all negatively associated with poor retention rates. On the other hand, patients who report high levels of recovery-oriented social support are 2.6 times more likely to remain abstinent than those who reported a lower level of support (Rudd et al., 2016). Similar trends were observed among patients when measuring the impact of living situations. Patients who did not have difficult living situations were 7.4 times more likely to remain abstinent compared to those who had difficult living situations or lived with someone who uses alcohol or other illicit drugs (Rudd et al., 2016). This highlights the importance of ensuring that individuals transitioning from the incarceration to their communities should have access to proper housing and recovery-oriented environments.

**Cost of Treatment: Methadone vs. Buprenorphine**

The cost of administering methadone or buprenorphine in corrections facilities to treat OUD may differ. Health providers from the Magura et al., (2009) study preferred administering methadone over buprenorphine for various reasons. On average, medical and nursing staff reported devoted approximately 15 minutes per inmate per day to prepare for, dispense, and monitor the ingestion of buprenorphine tablets during the study (Magura et al.,

2009). In this study, buprenorphine/ naloxone (Suboxone ® )was distributed in the shape of a sublingual tablet. Due to this, medical staff had to monitor the ingestion of buprenorphine tablets to prevent medication diversion attempts (Magura et al., 2009). On the other hand, the preparation and distribution of liquid methadone only took 1-3 minute per inmate. As a result, more inmates can be served with methadone compared to buprenorphine using the same staff resources and time. However, methadone requires daily administration whereas buprenorphine can be administered on alternate dates without losing its efficacy (Amass, Kamien, & Mikulich, 2000). Therefore, some may argue that this feature of buprenorphine may balance the staff time needed for preparation and medication dispersion or even save staff time to an extent compared to methadone (Magura et al., 2009).

**Financial Resources**

Due to the high cost associated with buprenorphine treatment, methadone is also more integrated into the medical care and criminal justice system compared to buprenorphine (Magura et al., 2009). Inmates tend to lose their Medicaid eligibility after release, which must be reestablished (Gisev et al., 2015; Magura et al., 2009). Depending on the area where individuals relocate upon release, access to buprenorphine treatment may be limited, unless there are community health centers or small community providers waived and willing to prescribe buprenorphine without the requiring Medicaid coverage. Zaller et al., 2013 found that community resources were extremely limited to uninsured individuals. Specifically, 56% of uninsured individuals did not have access to needed resources (Zaller et al., 2013).

Even upon reestablishment of Medicaid coverage, individuals may still struggle to access buprenorphine treatment for MAT compared to methadone (Magura et al., 2009). For instance, many community providers in cities, like New York City, do not accept Medicaid

coverage for buprenorphine treatment due to the lower rates associated with buprenorphine treatment (Magura et al., 2009; Zaller et al., 2013). In Zaller et al., 2013, many of the participants who re-established their Medicaid coverage reported having limited options for treatment. A possible solution to this issue would be the implementation of a generic form of buprenorphine that is as effective as the original formula.

**Access to Care Post-release**

It is also important for states to increase the number of providers waived to prescribe buprenorphine and accept Medicaid. Zaller et al., (2013) recommends the implementation of statewide multidisciplinary efforts to support primary care providers to become waivered to prescribe buprenorphine and collaborate with behavioral health providers to provide addiction recovery treatment. We would recommend Project ECHO as an intervention to facilitate the implementation of an interdisciplinary approach to treating opioid use disorders in former inmates.

Project ECHO is Project Extension for Community Healthcare Outcomes (Project ECHO®) was developed at the University of New Mexico to overcome the lack of access to specialty care for Hepatitis C, but has been applied to a variety of medical conditions since its initiation (Anderson et al., 2017; Arora et al., 2011; Komaromy et al., 2016). Project ECHO is a telehealth model that utilizes video conferencing technology to connect a multidisciplinary faculty of experts with clinicians who present cases and listen to short didactic lectures to gain specialist expertise and knowledge to treat patients with complex health conditions (Arora et al., 2011).

The Center for Rural Health at the University of North Dakota and the North Dakota Department of Health Services (NDDHS) implemented Project ECHO to educate and support

primary health providers to treat patients in rural areas with OUD and other substance use conditions (Kusler, 2018). According to Dr. McClean, co-director for Project ECHO at UND, "A major benefit of the TeleECHO clinic is access to a multidisciplinary group of experts and peers in one virtual spot (Kusler, 2018)."

Numerous Federally Qualified Health Centers in the United States have adapted Project ECHO (Anderson et al., 2017). A study investigating the impact of pain-focused Project ECHO on providers' knowledge and self-efficacy of pain treatment reported a significant increase in providers' knowledge and self- efficacy after participating in Project ECHO (Anderson, Zlateva, & Moore, 2015). Project ECHO has also been shown to increase providers' competence, skills, and performance (Zhou, Crawford, Serhal, Kurdyak, & Sockalingam, 2016).

Lastly, many community health centers employ Project ECHO as an intervention to reduce the cost of healthcare services for those who live in rural areas with limited access to specialty care (Zhou et al., 2016). Cost-effectiveness analyses evaluating the impact of an HCV Project ECHO on patient outcomes found that that Project ECHO may increase quality-adjusted life expectancy by 3.8 years and save patients $1,352 on average (Zhou et al., 2016). Another study showed that patients who live in rural areas saved an average of 187 travel miles per person by seeing a primary care provider who participates in Project ECHO rather than a specialist (Zhou et al., 2016).

### Implementing Statewide Interventions in Correctional Facilities

Given the health consequences of the lack of proper treatment for OUD in jails and prisons, it is imperative for states to develop strategic initiatives to provide treatment for OUD in correctional facilities and improve the post-release health outcomes of inmates. Rhode Islands is one of the few states that have implemented such statewide intervention in their corrections facilities. In 2015, the governor of Rhode Island incorporated corrections-based recommendations in their overdose reduction plan by creating the Overdose Prevention and Intervention Task Force (Montanaro et al., 2015). In an effort to improve treatment for OUD in prisons and jails, the task force implemented MAT programs in their corrections facilities for the treatment of OUD among incarcerated individuals.

The implementation of their statewide MAT programs in correctional facilities resulted in a 61% reduction in overdose deaths, which accounted for an overall 12% reduction in drug-overdose related deaths in the state (Green et al., 2018). This suggests that the implementation of a comprehensive and multidisciplinary MAT treatment in jails and prisons, with linkage to post-release treatment, is an effective strategy to address the opioid epidemic not only in correctional settings but also during transitioning periods after release.

## Conclusion

This summary provides limited support for the implementation of medication-assisted treatment (MAT) programs in correctional facilities in the United States. There is strong evidence of the ability for MAT programs to effectively treat OUD in incarcerated individuals and improve their post-release health outcomes. Access to MAT during incarceration is strongly associated with a higher likelihood of treatment continuation and lower risks for illicit drug use, drug-overdose, HIV risk behaviors, among other outcomes. Given the

overrepresentation of opioid use disorder (OUD) in prisons and jails and the lack of access to care for those in need, this paper provides evidence regarding the importance of providing proper care for OUD during incarceration. Using correctional settings as a venue to address the opioid epidemic could benefit both incarcerated individuals and the communities to which they return upon release. Rhode Island's statewide implementation of MAT in correctional facilities is good evidence that efforts to implement statewide strategies to address the opioid epidemic in the incarcerated population can result in positive public health impacts (Green et al., 2018). Most importantly, proper actions must be taken to ensure that individuals who received opioid-substitution treatment during incarceration continue to have access to recovery-oriented environments that can help them successfully reach positive health outcomes.

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# Appendix A

**Table 1.** Study Summary

| Author(s), date | Location (State) | Setting | Design | Intervention | Comparator (s) | Outcomes | Follow-up | Methodological Limitations | Impact on Study |
|---|---|---|---|---|---|---|---|---|---|
| Brinkley-Rubinstein et al., 2017 | Rhode Island | Unified prison and jail system | Randomized controlled trial (RCT) | Methadone | Forced withdrawal from Methadone | 1. Treatment retention 2. Substance use 3. Overdose 4. HIV risk 5. Re-incarceration | 12 months | Setting (unique state-wide unified prison and jail system) | Generalizability |
| | | | | | | | | Small sample size | Generalizability |
| | | | | | | | | Only included individuals incarcerated for 6 months or less and differences in length of sentence between the 2 groups | Selection bias |
| | | | | | | | | Loss to follow-up | Selection bias |
| | | | | | | | | Self-reported data | Response Bias |
| Kinlock, 2009 | Baltimore | Prison | RCT | Methadone | 1. Counseling only 2. Counseling + transfer | 1.Treatment retention 2. Urine Drug Test 3. Drug use days 4. Criminal activity 5. Arrest 6. Employment 7. Serious Adverse | 12 months | Loss to follow-up and inability to conduct a urine drug test on all participants | Selection bias |
| | | | | | | | | Exclusive male population prisoner population in Baltimore | Generalizability |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| McKenzie, 2012 | Rhode Island | Unified prison and jail system | RCT | Methadone | 1. Referral for Post-release MMT with financial assistance<br>2. Referral to post-release MMT without financial assistance | 1. Time until treatment re-entry<br>2. Overdose Relapse | 6 months | Self-reported data | Social desirability bias |
| | | | | | | | | Small sample size | Generalizability |
| | | | | | | | | Setting (unique statewide unified prison and jail system) | Generalizability |
| | | | | | | | | Loss to follow-up | Selection bias |
| Magura, 2009 | New York | Jail | RCT | Buprenorphine | Methadone | 1. Treatment retention<br>2. Drug use<br>3. Re-incarceration | 3 months | Loss to follow-up | Reduce Power |
| | | | | | | | | All male sample | Generalizability |
| Gordon, 2017 | Baltimore | Prison | RCT | Buprenorphine | 1. Post-release buprenorphine treatment in OTP or<br>2. CHC | 1. Treatment retention<br>2. Drug use | 1 month<br>3 month<br>6 months<br>12 months | Loss to follow-up | Selection bias, Reduced Power |
| | | | | | | | | Self-reported data | Social desirability bias |
| | | | | | | | | Predominantly African American prison population and fewer women | Generalizability |
| Zaller, 2013 | Rhode Island | Prison | RCT | Buprenorphine | Post-release initiation of buprenorphine | 1. Treatment retention<br>2. Drug use and overdose<br>3. Re-incarceration | 6 months | Small sample size | Generalizability/ reduce power/ inability to conduct 12 month follow-up interviews |
| | | | | | | | | Loss to follow-up | Reduce Power |
| | | | | | | | | Self-reported data | Social desirability bias |
| Springer, 2012 | Connecticut | Prison | RCT | Buprenorphine | 1. Self-administered therapy (SAT) | 1. Achieving maximal viral | 6 months | Small sample size | Generalizability/ Reduce Power |
| | | | | | | | | Non-randomization of participants | Selection bias |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | suppression (MVS) | | Failure to control for factors that may influence retention (homelessness, mental illness, social support, etc.). | Reduced Power |
| Rich, 2015 | Rhode Island | Prison | RCT | Methadone | Forced withdrawal from Methadone | 1. Post-release treatment entry<br>2. Treatment retention<br>3. Drug use<br>4. Overdose | 1 month | Inability to control the length of incarceration | Generalizability |
| | | | | | | | | Setting (Single institution with a predominantly white population) | Generalizability |

**Black text-** Experimental group received methadone for MAT

**Purple Text-** Experimental group received buprenorphine for MAT

## Appendix B

**Table 2**. Outcome Measures

| Outcome | Studies with Positive Outcomes (P<0.05) | No Effect/ No significant difference *(Outcomes, if other)* |
|---|---|---|
| **Treatment retention** | Brinkley-Rubinstein et al., 2017 | |
| | Kinlock et al., 2009 | |
| | Magura, 2009 | |
| | Gordon, 2017 | |
| | Zaller, 2013 | |
| | Rich, 2015 | |
| | Brinkley-Rubinstein et al., 2017 | |
| **Drug Use** | Brinkley-Rubinstein et al., 2017 | Magura, 2009 |
| | Kinlock et al., 2009 | Gordon, 2017 |
| | McKenzie, 2012 | |
| | Zaller, 2013 | |
| **Overdose** | Brinkley-Rubinstein et al., 2017 | Rich, 2015 |
| **HIV- risk behavior** | Springer, 2012 | Rubenstein et al., 2017 |
| **Other** | McKenzie, 2012 *(Time to treatment re-entry)* | Rubenstein et al., 2017 *(re-incarceration, visit to the emergency department, use of prescription opioids, alcohol, cannabis, or other drugs)* |
| | Zaller, 2013 *(Re-incarceration)* | Kinlock et al., 2009 *(drug use days, criminal activity, arrests, employment)* |
| | | Magura, 2009 (re-arrest) |
| **Other** | | Rich, 2015 *(Visit to the emergency room, admission to hospital)* |

**Black text-** Methadone **Purple text-** Buprenorphine