Recent Incarceration and Buprenorphine Maintenance Treatment Outcomes Among HIV-positive Patients

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Abstract

Background—Opioid use disorder is a common cause of morbidity and mortality among people living with HIV/AIDS. Buprenorphine maintenance treatment (BMT) is an effective means of therapy, but patients with recent criminal justice involvement may need more support during BMT than other patients. We hypothesized that recently incarcerated BMT patients who initiated treatment in primary care would have poorer treatment outcomes than those who were not recently incarcerated.

Methods—We analyzed data from a multi-site cohort study of BMT integrated into HIV care. Patients were stratified by self-reported incarceration in the 30 days before initiation of BMT. The outcomes of interest were 6 and 12-month treatment retention and self-reported opioid use. We used multivariable logistic regression and hierarchical linear model, respectively, to evaluate the association between recent incarceration and these outcomes while adjusting for potential confounding variables.

Results—Among 306 BMT patients living with HIV/AIDS, 39 (13%) reported recent incarceration. Patients with recent incarceration (vs. without) were more likely to be homeless, unemployed, and previously diagnosed with mental illness. Recent incarceration was not significantly associated with differences in 6-month (OR = 0.95; 95% CI = 0.46–1.98) and 12-month treatment retention (OR = 0.57; 95% CI = 0.27–1.18) or in self-reported opioid use (OR = 0.99; 95% CI = 0.51–1.92) after adjustment for potential confounding variables.

Conclusions—Those with incarceration in the 30 days prior to BMT initiation were more likely to be homeless, unemployed, and previously diagnosed with mental illness than those without recent incarceration. However, we did not detect a difference in in self-reported opioid use, 6-month or 12-month retention in treatment between those with and without recent incarceration. Future studies should confirm these findings with larger sample sizes. Encouraging formerly incarcerated individuals with opioid use disorder to initiate evidence-based treatments, including BMT, should be part of efforts to confront the opioid addiction epidemic in the United States.

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INTRODUCTION

In 2014, nearly 2.5 million Americans met criteria for an opioid use disorder,[1] and nearly 30,000 died from opioid-related overdoses.[2] Illicit opioid use also negatively affects quality of life.[3] Treatment with buprenorphine or methadone can mitigate these negative effects.[4] World Health Organization guidelines highlight pharmacotherapy using either buprenorphine or methadone paired with psychosocial therapy as the most effective means of treating opioid use disorder.[5] Buprenorphine is particularly useful because it can be self-administered at home, has low potential for overdose, and may be less stigmatized than methadone.[6] Buprenorphine maintenance treatment (BMT) may be offered in primary care or addiction treatment settings with the goal of providing pharmacotherapy and psychosocial counseling over a period of at least months to years.

Among the negative consequences of opioid use disorder is frequent involvement in the criminal justice system. Up to 1/3 of heroin users (200,000 individuals) are incarcerated annually in the United States.[7] Initiating pharmacotherapy with buprenorphine or methadone prior to release from incarceration has been feasible and effective in clinical trials.[8–12] However, few individuals in the United States actually receive these treatments while incarcerated.[13] Due to the chronic relapsing nature of opioid use disorder, even those who abstain from opioid use while incarcerated may still require treatment following release.[14] Without pharmacotherapy, rates of relapse to illicit opioid use following release from incarceration may be greater than 80%.[15] BMT appears to be highly acceptable among individuals with criminal justice involvement,[16] but additional research is necessary to optimize treatment for this high-needs population.

The interrelated problems of opioid use disorder and incarceration can be particularly challenging for people living with HIV/AIDS. One in seven Americans with HIV/AIDS pass through correctional facilities annually.[17] A large cohort of formerly incarcerated individuals living with HIV/AIDS demonstrated a prevalence of opioid use disorder of 37%.[18] Treatment of opioid use disorder with methadone or buprenorphine reduces illicit opioid use and improves HIV treatment outcomes,[19–21] including among those with criminal justice involvement.[22,23] Thus, integrating BMT into HIV-treatment settings has been a priority in the United States,[24] but patients with criminal justice involvement may have unique treatment needs (e.g., increased counseling or closer supervision).

To date, studies have been conflicting as to whether criminal justice involvement affects treatment for opioid use disorder. Data from community methadone maintenance treatment programs suggest that criminal justice involvement can negatively affect treatment outcomes.[25,26] In contrast, a study of BMT in primary care demonstrated that patients with any prior incarceration for more than three days in their lifetime had similar treatment retention and illicit opioid use to patients without prior incarceration.[27] However, it is

possible that a recent incarceration may have a greater destabilizing effect on treatment than incarcerations happening more distantly in the past. Another study from primary care demonstrated that BMT patients with criminal charges in the two years prior to initiating treatment had lower treatment retention and opioid abstinence than those without recent criminal charges.[28] The challenges of community re-entry after release from incarceration have been documented in numerous qualitative studies, therefore, recent incarceration might also negatively affect BMT outcomes.[29–31]

To study the interplay between incarceration, BMT and HIV care, we conducted a secondary analysis of data from the Buprenorphine-HIV Evaluation and Support Collaborative (BHIVES). BHIVES was a multi-site, longitudinal cohort study that evaluated whether BMT could be effectively integrated into diverse HIV treatment settings.[24] Following the study, BHIVES providers reported challenges with a subset of HIV-positive BMT patients, including those with multi-substance use, cognitive impairments, or "chaotic" life stressors such as incarceration.[32]

In this analysis, we compared BMT outcomes among HIV patients with and without a history of recent incarceration. We hypothesized that those with recent incarceration would exhibit lower treatment retention and higher opioid use.

METHODS

Setting

The BHIVES collaborative consisted of ten independent sites across the United States, which included seven academic medical centers, two community clinics, and a public hospital. Only one of the sites had prior experience with BMT. Representatives from Yale University provided clinical support and training for implementation. Although sites were given autonomy over how best to integrate BMT into preexisting HIV treatment programs, all provided comprehensive medical and social services to primarily low-income patient populations. Sites had either: all HIV providers prescribe BMT to their own patients (three sites); a few HIV providers who also prescribed BMT to all patients in the practice who needed treatment (six sites); or co-located but separate HIV and BMT specialists. All sites appointed non-physician providers to coordinate medical care with substance use counseling (all sites), case management (all sites), and follow-up outreach (8 sites). Coordinators came from range of disciplines including nurse practitioners, substance use counselors, health educators, and pharmacists. Protocols for BMT prescribing (e.g., frequency of follow-up) were determined by individual sites.[32] The study was approved by affiliated institutional review boards.

Patients

Criteria for patient inclusion has been described elsewhere.[24] Briefly, patients had to be HIV-infected, diagnosed with the DSM-IV definition of opioid dependence, and greater than 18 years of age. Reasons for exclusion were pregnancy, liver function tests at higher than five times normal levels, benzodiazepine use disorder, alcohol use disorder, suicidal

ideations, or severe cognitive impairment. The current analysis only considers patients from the study who received BMT.

Data Collection

The sites developed standardized measures to assess opioid use disorder treatment outcomes. Interviews were collected at baseline (i.e. upon initiating BMT) and then at quarterly intervals for a year. Survey data included sociodemographic information, criminal justice status, and self-reported substance use. Chart abstraction was performed at the end of patient participation in order to ascertain whether or not patients continued to receive BMT during each quarter.

Measures

Incarceration—Patients were asked at baseline "[h]ow many days in the past 30 days were you detained or incarcerated". We defined "recent incarceration" (dichotomous, yes/no) as whether the patient reported greater than 0 days.

Follow-up intervals—Outcomes were reported at 3 months (60–135 days after baseline), 6 months (135–225 days), 9 months (225–315 days), and 12 months (315–405 days).

BMT retention—BMT assignment was reported from chart abstraction at each follow-up visit. In order to be defined as retained, patients needed to be assigned to BMT for every consecutive interval up to the given one. For example, we defined "12-month retention" as the patient received BMT at 3, 6, 9, and 12 months. Patients who re-initiated BMT after a lapse in treatment were not defined as retained. Retention was considered as an ordinal variable.

Opioid use—Because different study centers had different protocols for urine drug testing, the presence of illicit opioids in the urine was not included as a treatment outcome in this analysis. In baseline and follow-up interviews, patients were asked how many days in the past 30 they had used heroin, methadone, and "other opiates/analgesics" respectively. We defined "illicit opioid use" (dichotomous, yes/no) as any self-report of heroin, methadone, or "other opiate/analgesic" use at each follow-up interview. Therefore, each patient could have up to four follow-up interviews for assessment of this outcome.

Key covariates—Interviews also assessed age, race/ethnicity, gender, any history of injecting drugs (dichotomous, yes/no), any history of heroin use (dichotomous, yes/no), addiction severity index score (continuous),[33] number of times treated for "drug abuse", self-reported homelessness (dichotomous, yes/no), education (at least high school graduation or GED, dichotomous, yes/no), employment (works for pay—"on or off the books", dichotomous, yes/no), self-reported diagnosis of a "serious mental illness" (e.g. depression, anxiety, schizophrenia, bipolar disorder, dementia, or borderline personality, dichotomous, yes/no), and study site location (categorical).

Data analysis

We conducted descriptive analysis of baseline characteristics for all patients. These patients were subsequently stratified by recent incarceration at baseline. We compared baseline characteristics between those who did and did not report recent incarceration using either a Student's t-test, a Mann-Whitney U-test, a chi-squared test, or a Fisher's exact test as appropriate.

To examine the association between recent incarceration and retention, we first determined the percentage of patients retained in BMT for each follow-up interval with patients stratified by recent incarceration status at baseline. A chi-squared test was applied to each interval.

Next, we constructed two separate multivariable logistic regression models with recent incarceration at baseline as the main independent variable and retention in treatment at 6 or 12-months as the respective dependent variables (*logistic* function, Stata 14.1). We included the following variables in all models based on clinical relevance: age, race, gender, and prior injection drug use reported at baseline. We then selected additional covariates for the model that were associated with the independent variable (α 0.20) in the bivariate testing described above. We then used backwards step-wise subtraction of non-statistically significant variables (α 0.05) to arrive at the final model.

Because age measurements were missing for 28% of patients, we performed univariate imputation of age with the predictive mean matching method (*mi impute pmm* function, Stata 14.1). We selected variables to be included in the imputation if they were present in the logistic model of treatment retention above or if they significantly predicted age in simple linear regression.

Finally, we used hierarchical linear modeling (HLM) to determine the association between recent incarceration at baseline and illicit opioid use during follow-up (*PROC GLIMMIX*, SAS 9.4). Because each patient could have multiple follow-up interviews, this procedure accounted for clustering of follow-up visits within individual patients. Again, recent incarceration was the main independent variable, and self-reported illicit opioid use was the dependent variable. Covariates, which were selected by the same method as above, were considered to be fixed effects because they were derived from baseline interviews. We imputed age as above.

RESULTS

In the entire cohort of 306 individuals, mean age was 45 years, most patients were black (51%) or Hispanic (22%), and male (67%). Thirty-nine (13%) were recently incarcerated. Baseline characteristics did not significantly differ between those with and without recent incarceration. However, those with recent incarceration (vs. those without) were more likely to report homelessness (41% vs. 23%, $p < 0.05$), unemployment (90% vs. 72%, $p < 0.05$), and diagnoses of serious mental illness (73% vs. 53%, $p < 0.05$). Those with recent incarceration also reported a greater median number of times treated for substance use disorders, suggesting more severe addiction in the past (5 vs. 3, $p < 0.05$) (see Table 1).

Both those with and without recent incarceration showed decreased retention over time. Sixty-six percent of patients were retained in BMT at 6 months regardless of incarceration status; at 12 months, 39% of those with recent incarceration at baseline were retained in BMT versus 50% of those without (p = 0.19) (see Figure 1).

After adjustment for age, race, gender, and history of injection drug use, recent incarceration at baseline still was not significantly associated with 6-month (OR = 0.95; 95% CI = 0.46–1.98) or 12-month retention (OR = 0.57; 95% CI = 0.27–1.18). However, in the final multivariable model, male gender decreased and age increased predicted odds of 12-month retention significantly (see Table 2).

After adjustment for age, race, gender, history of injection drug use, addiction severity index score, and homelessness, recent incarceration was not significantly associated with the odds of opioid use at any follow-up visit (OR = 0.99; 95% CI = 0.51–1.92). However, in the final multivariable model, homelessness decreased and addiction severity increased the predicted odds of opioid use significantly (see Table 2).

DISCUSSION

In this study assessing BMT outcomes in patients living with HIV/AIDS, those with incarceration in the 30 days prior to BMT initiation were more likely to be homeless, unemployed, and previously diagnosed with mental illness than those without recent incarceration. However, we did not detect significant differences in self-reported opioid use, 6-month, or 12-month retention in BMT, including after adjustment for potential confounding factors. Our findings suggest that patients in the community who seek treatment for opioid use disorder can achieve standard outcomes with BMT in spite of histories with recent incarceration.

Our work confirms others findings and expands their applicability to patients who are recruited from the community and/or are living with HIV/AIDS. Wang et al. analyzed data from a randomized controlled trial of BMT and counseling in primary care and similarly did not find a difference in treatment retention or opioid use between primary care patients stratified by any history of incarceration.[27] Lee et al. assessed the effects of more recent incarceration by comparing patients connected to community-based BMT after release from jail with patients recruited directly from the community.[34] They also found similar rates of treatment retention and opioid use between groups. However, the majority of incarcerated patients had initiated BMT before release, thereby providing continuity of care during the period of community reentry. A pilot study comparing pre-release vs. post-release initiation of BMT demonstrated superior treatment retention among prisoners initiating treatment prior to release.[35] Therefore, our findings may be more applicable than those of Lee et al. for primary care providers looking to initiate BMT for patients in the community who have recently been incarcerated. Two other studies also examined BMT outcomes among individuals on probation or parole, many of whom may have been recently incarcerated. Mitchell et al. found no difference in treatment retention or opioid use in a randomized controlled trial of buprenorphine and outpatient counseling when comparing patients who were on probation or parole to those who were not.[36] Gordon et al. examined a cohort of

BMT patients on probation or parole and found a slightly lower rate of 3-month retention (67%) than our study, but there was no comparison group of patients who were not on probation or parole.[37] Taken together, these studies suggest that criminal justice status does not absolutely dictate poor BMT outcomes, at least in large urban areas similar to the ones where these studies took place.

We were surprised that we could not establish a difference in BMT outcomes between those who had and had not recently been incarcerated. We had expected that recent incarceration would be more acutely destabilizing. It is possible that we failed to detect any negative effects of recent incarceration due to a lack of power. The point estimate for the odds ratio of retention at 12 months was 0.57, which could represent a clinically meaningful difference. It is also possible that factors unique to HIV-positive populations, such as availability of special benefits or supportive services, protected study patients from destabilization following release from incarceration. These findings could be different in an HIV-negative population. Additionally, being under criminal justice supervision (i.e. probation or parole) might have also influenced outcomes; however, adjusting for probation or parole status did not change the association between recent incarceration and treatment retention or opioid use (data not shown). Recent incarceration may have provided motivation or increased urgency to stop illicit opioid use; however, our data does not include a measure of motivation for treatment. Future studies examining BMT outcomes among individuals with recent incarceration should account for age, gender, addiction severity, and homelessness, as these factors were associated with BMT outcomes in our study. Other unidentified factors may also be important.

The strengths of our study include the diverse treatment settings, multiple study sites from across the United States, and adjustment for multiple potential confounding variables. However, there were also multiple limitations. As with any observational study, we cannot establish clear causative relationships between incarceration and buprenorphine treatment outcomes. Our sample size for those with recent incarceration was small, which limited our ability to perform some multivariable analyses and may have led to Type II error. The cohort was HIV positive, so generalizability to HIV-negative individuals is challenging; repeating this analysis in an HIV-negative population may uncover differences in outcomes. Most treatment sites were in urban areas, and we do not know if these findings would generalize to other geographic areas. Finally, our study relied heavily on self-reported factors.

In conclusion, our study provides more evidence that BMT is an effective opioid use disorder treatment for individuals with and without criminal justice involvement. Treatment retention and self-reported opioid use among recently incarcerated patients was not significantly worse than in patients without such a history. Encouraging formerly incarcerated individuals with opioid use disorder to initiate evidence-based treatments, including buprenorphine maintenance treatment, should be part of efforts to confront the opioid addiction epidemic in the United States.

Acknowledgments

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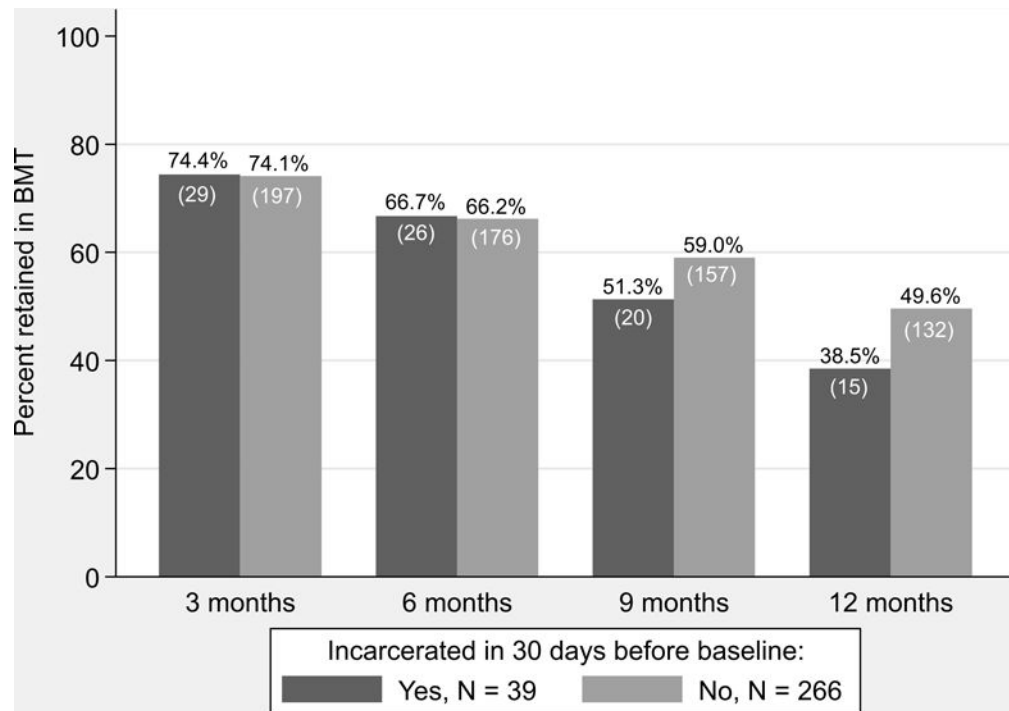
FIGURE 1. Consecutive months of retention in buprenorphine maintenance treatment of HIV-infected patients stratified by recent incarceration at baseline

Chi-square analysis: all comparisons non-significant | Buprenorphine retention = received any buprenorphine during given quarter and all previous quarters | N = sample size.

Table 1

Baseline characteristics of HIV-infected patients receiving buprenorphine treatment for opioid use disorder:

	All (N = 305)	Not recently incarcerated (N = 266)	Recently incarcerated (N = 39)	P-value[*]
Age[a], mean years +/− SD	44.6 +/− 8.5	44.6 +/− 8.4	44.4 +/− 9.3	0.93
Race/Ethnicity[b], n (%):				
Non-Hispanic White	68 (22.3%)	61 (22.9%)	7 (18.0%)	0.56
Non-Hispanic Black	156 (51.2%)	133 (50.0%)	23 (59.0%)	0.47
Hispanic	67 (22.0%)	59 (22.2%)	8 (20.5%)	0.71
Non-Hispanic Other	10 (3.3%)	9 (3.4%)	1 (2.6%)	1.00
Male, n (%)	205 (67.2%)	179 (67.3%)	26 (66.7%)	0.94
Ever injected drugs, n (%)	241 (79.0%)	207 (77.8%)	34 (87.2%)	0.18
Ever used heroin, n (%)	292 (95.7%)	253 (95.1%)	39 (100%)	0.16
Drug addiction severity index[c], mean +/− SD	25.7 +/− 11.7	26.3 +/− 11.4	21.7 +/− 12.7	**0.04**
Times treated for drug abuse[d], median (IQR)	3 (2–6)	3 (2–6)	5 (3–7)	**0.03**
Homelessness, n (%)	76 (24.9%)	60 (22.6%)	16 (41.0%)	**0.01**
High school diploma or equivalency[e], n (%)	174 (57.1%)	157 (59.0%)	17 (43.6%)	0.17
Employed, n (%)	78 (25.6%)	74 (27.8%)	4 (10.3%)	**0.02**
Diagnosed with mental illness[f], n (%)	167 (54.8%)	140 (52.6%)	27 (69.2%)	**0.02**

[*] Chi-square, Fisher's Exact Test, Mann-Whitney Test, or T-Test as appropriate

[a] Missing 84 observations

[b] Missing 4 observations

[c] Missing 5 observations

[d] Missing 3 observations

[e] Missing 1 observation

[f] Missing 5 observations

Table 2

Association of baseline patient characteristics with BMT outcomes in multivariable models:

Variable	6-month treatment retention		12-month treatment retention		Self-reported opioid use	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Recent incarceration	0.95	0.46–1.98	0.57	0.27–1.18	0.99	0.51–1.92
Age	1.02	0.98–1.05	**1.04**	**1.01–1.07**	0.99	0.96–1.02
White	0.71	0.39–1.28	0.57	0.31–1.04	0.91	0.54–1.55
Male	1.13	0.67–1.90	**0.56**	**0.34–0.94**	0.89	0.57–1.40
Inject drugs	0.70	0.37–1.34	0.80	0.43–1.48	1.42	0.82–2.46
Addiction severity index	*	*	*	*	**1.03**	**1.01–1.05**
Homelessness	*	*	*	*	**0.57**	**0.34–0.96**

*
= dropped from final model