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Effect of lowering initiation thresholds in a primary care-based buprenorphine treatment program

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ABSTRACT

Background: Office-based buprenorphine treatment is effective for opioid use disorder. Scant research has examined programmatic factors impacting successful initiation of treatment. To increase initiation of eligible patients, our buprenorphine program implemented changes to lower treatment thresholds. Most notable among these was elimination of a requirement that patients demonstrate abstinence from stimulants prior to initiating buprenorphine.

Methods: This observational, retrospective study included patients screened for primary care-based buprenorphine treatment under high- and low-threshold conditions from 2015 to 2017. Background characteristics and treatment data were extracted from the electronic medical record and clinical registry. Chi-squared tests were used to compare proportions of patients initiated within 90 days of screening and retained to 60 days after initiation, under both conditions. Multivariate logistic regression was employed to compare relative odds of buprenorphine initiation after adjustment for several covariates. All analyses were stratified by recent stimulant use.

Results: The sample of 168 patients included 96 in the high-threshold group and 72 in the low-threshold group. Among patients with recent stimulant use, low-threshold conditions were associated with a higher proportion of patients initiated (69% versus 35%, p = 0.002) and higher relative odds of initiation (aOR = 7.01, 95% CI = 2.26–21.80) but also with a lower proportion of patients retained (63% versus 100%, p = 0.004). Among patients without recent stimulant use, low-threshold conditions did not change these measures by a statistically significant margin.

Conclusions: Lower-threshold policies may increase buprenorphine treatment initiation for patients with co-occurring stimulant use. However, patients using stimulants may require additional supports to remain engaged.

1. Introduction

Buprenorphine, a partial mu opioid agonist, is an effective treatment for opioid use disorder (OUD) (Mattick et al., 2014; Nielsen et al., 2016). Entry into buprenorphine treatment in the primary care setting leads to reduced illicit opioid use (Mattick et al., 2014) and overdose deaths (Larochelle et al., 2018), offers an opportunity for identification and treatment of chronic diseases (Rowe et al., 2012), and reduces risk for HIV and hepatitis C infection (Tsui et al., 2014; Woody et al., 2014). In the United States, methadone for treatment of OUD is restricted to federally regulated opioid treatment programs with limited geographic dispersion (Gryczynski et al., 2011; Kourounis et al., 2016). In contrast, buprenorphine can be prescribed by any waivered provider who has met the training requirements. It thus has the potential to allow for expanded access to treatment (Arfken et al., 2010; Sullivan et al., 2005). However, expanding capacity requires both training physicians and optimizing programs (Arfken et al., 2010; Walley et al., 2008). A variety of procedural barriers, including rigid admissions criteria, scheduling and logistical challenges, and inflexible adherence requirements, may diminish enrollment in and success of buprenorphine treatment (Kourounis et al., 2016).

The “cascade of care” paradigm examines healthcare delivery at

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successive stages along a continuum of care, from diagnosis and engagement of appropriate patients in treatment to retention, survival, and other downstream outcomes (Socías et al., 2016). It has been proposed as a means for measuring effectiveness of substance use disorder treatment (Norton et al., 2017; Socías et al., 2016), and research in our clinic has previously used this framework (Simon et al., 2017). Numerous studies have examined predictors of patient retention, medication adherence, and abstinence from substance use in buprenorphine treatment (Alford et al., 2011, 2007; Bhatraju et al., 2017; Cunningham et al., 2013; Dreifuss et al., 2013; Haddad et al., 2013; Kumari et al., 2016; Lee et al., 2017; Marsch et al., 2005; Sullivan et al., 2010), but few have focused on the process of engagement, here defined as progression from contact with a treatment program to initiation of buprenorphine (Lee et al., 2017; Simon et al., 2017). Many patients may be lost during this critical first step in the cascade of care for buprenorphine treatment (Simon et al., 2017).

Evaluation for buprenorphine treatment typically includes assessment of co-occurring substance use by both interview and urine drug testing (UDT) (Substance Abuse and Mental Health Services Administration, 2018; Walley et al., 2008; Woody et al., 2014), but there is no clear consensus as to whether polysubstance use should disqualify a patient from receiving the medication. Buprenorphine may be diverted to finance non-opioid substance use or interact deleteriously with sedatives such as alcohol and benzodiazepines (Cicero and Inciardi, 2005; Crane, 2013; Kraus et al., 2011; Tsui et al., 2018). Diversion is of concern with wider medication availability, though sources report varying frequencies (Johanson et al., 2012; Lavonas et al., 2014; Maxwell, 2006). Inability to access buprenorphine through a provider is a significant risk factor for non-prescribed use, leading some authors to suggest that the prevalence of this behavior calls for engaging more, rather than fewer, patients in care (Lofwall and Havens, 2012; Lofwall and Walsh, 2014; Maxwell, 2006; Richert and Johnson, 2015). Some studies of buprenorphine treatment programs suggest that people who use both cocaine and opioids may see reduced opioid misuse with buprenorphine maintenance (Cunningham et al., 2013; Montoya et al., 2004). However, there is also evidence that such patients are at increased risk for non-adherence and early dropout relative to patients who do not use cocaine (Kumari et al., 2016; Marsch et al., 2005; Sullivan et al., 2010). Comparatively little evidence exists regarding the implications of amphetamine or methamphetamine co-use in patients receiving buprenorphine.

Our buprenorphine program is embedded within a primary care clinic at our institution, and its structure is drawn from the Massachusetts Nurse Care Manager Model (Alford et al., 2011; Chou et al., 2016). Previous research in our clinic demonstrated that sixty percent of patients who underwent intake interviews were lost to treatment prior to starting buprenorphine (Simon et al., 2017). Specifically, odds of initiation were significantly lower among individuals with polysubstance use, prompting our program to implement policy and procedural changes to lower initiation thresholds. This included removing the requirement that patients demonstrate abstinence from stimulants (based on UDT results) before starting buprenorphine (Simon et al., 2017).

To our knowledge, no studies have specifically explored the relationship between buprenorphine program design and patients' odds of initiating treatment. The purpose of this investigation is to identify associations between a lower-threshold program design and progression through the cascade of care. Specifically, we hypothesized that a cohort of patients who sought treatment after the implementation of low-threshold conditions would be more likely to initiate buprenorphine than those patients attempting engagement under stricter conditions.

2. Methods

2.1. Setting

This retrospective study was performed at a buprenorphine treatment program embedded within a primary care clinic at an urban academic medical center. The program's organization has been described previously (Simon et al., 2017) and is based on the Massachusetts Nurse Care Manager Model (Alford et al., 2011; Chou et al., 2016). In this model, trained nurse care managers (NCM) coordinate most of the day-to-day aspects of a patient's buprenorphine care and meet frequently with the patient during stabilization and maintenance phases; medication induction and oversight are provided by a collaborating physician. Delegating these tasks to an NCM, rather than the prescribing physician, allows a larger volume of patients to be cared for while placing less demand on the physicians' time. Clinic providers' time is divided between academic pursuits, primary care, and addiction treatment, allowing for about 10–12 new buprenorphine patients to be initiated each month.

2.2. Subjects

The study sample included patients 18 years or older screened in the program between December 2015 and May 2017. Only patients who had a completed intake form in the electronic medical record (EMR) were included in analyses. Exclusion criteria were the following: 1) currently taking prescribed buprenorphine at the time of screening, 2) immediate referral to a higher level of care (e.g., inpatient treatment), 3) initiation start date not documented, 4) hospitalized at the time of buprenorphine initiation, 5) insufficient data regarding follow-up or recent stimulant use, and 6) ambiguously documented path to buprenorphine initiation, which referred to discrepancies between the EMR and separate clinical registry. The registry was maintained by the program manager and included dates of initiation and discharge.

2.3. Data collection

Demographic data (age, race, ethnicity, sex), visit dates/attendance, UDT results, buprenorphine initiation date, if applicable, and screening form data were abstracted from the EMR. Data from the screening form included additional demographics (e.g., housing and relationship status) and clinical features (e.g., drug use and treatment history). Screening forms were completed by either the program manager (non-clinical staff) or nurse care managers during standardized intake interviews which took place either in-person or over the phone. In order to minimize bias, trained staff used a standard screening form adapted from the buprenorphine treatment program on which ours was modelled (Alford et al., 2011). Additionally, dates and circumstances of discharge, if applicable, were obtained from the program's clinical registry.

The majority of data for the high-threshold group were abstracted for a previous study (Simon et al., 2017) by one researcher (CBS), and additional abstraction of the EMR was performed by BEP. The two researchers consulted to ensure consistency in coding of data. This study was approved by the University of Washington Institutional Review Board.

2.4. Measures

The pathway from screening to buprenorphine initiation, as implemented at our program's inception, has been described previously (Simon et al., 2017). Briefly, a typical progression includes an initial screening interview, an NCM intake visit, UDT, a physician visit, and finally an at-home or observed initiation of buprenorphine. We use the same UDT algorithm in all stages of treatment, including induction, stabilization, and maintenance. If initial immunoassay results do not

match expected results reported by the clinician when the test is ordered, confirmatory gas chromatography/mass spectrometry is conducted. If actual and expected immunoassay results do match, no further testing is done.

The primary outcome of interest was successful buprenorphine initiation, defined as a record of the patient taking a first dose of prescribed buprenorphine within 90 days of initial contact. A secondary outcome of retention to 60 days after initiation was also examined along with the composite outcome of both initiation within 90 days and retention 60 days thereafter. Non-retention was defined as administrative discharge (for remaining out of contact for 30 days past the end-date of the last buprenorphine prescription) or transfer to an alternative treatment setting by recommendation of the treatment team (e.g., for tampering with urine, consistently opioid-positive urine screens, or absence of buprenorphine in urine). Urine tampering is defined as inappropriate urine toxicology results (e.g., presence of buprenorphine at supra-therapeutic levels without evidence of buprenorphine metabolites). In these situations, patients are provided options of transferring care to an alternative setting, which is facilitated to ensure uninterrupted buprenorphine prescribing. The decision to transfer treatment is at the discretion of the provider.

The predictor of interest was whether a patient was screened during the high- or low-threshold period. The high-threshold group was screened from December 1, 2015 to June 7, 2016, and the low-threshold group was screened from December 1, 2016 to May 31, 2017. Differences between the high- and low-threshold conditions that define treatment groups are outlined in Table 1. December 1, 2016 was the date upon which providers agreed that the requirement of stimulant abstinence was removed, and other policy/procedure changes described in Table 1 occurred contemporaneously. Because policy changes were discussed in clinic meetings with providers, and decision making was centralized by the nurse care manager, inter-provider differences in implementation were assumed to be negligible.

Recent use of stimulants was defined as either a positive baseline urine drug test for cocaine or amphetamine/methamphetamine or patient-reported use of these substances (Large et al., 2012) anytime within the past 3 weeks. Recent use of heroin or other non-heroin opioids was defined exclusively based on patient-reported use within the past 3 weeks, as routine UDT did not distinguish between those substances.

2.5. Statistical analysis

Descriptive statistics were used to characterize and compare study participants screened during the high- and low-threshold periods. These baseline characteristics were compared using Student's *t*-test for continuous variables (age) and Pearson's chi-squared test for categorical variables. Chi-squared tests were also used to compare the following outcomes in the high- versus low-threshold groups: 1) proportion initiated within 90 days, 2) proportion retained to 60 days of those initiated, and 3) proportion of total both initiated and retained. Outcome comparisons were stratified a priori by stimulant use because the change in UDT requirements was expected to streamline initiation particularly for patients using stimulants. Logistic regression (LR) analysis was performed for the outcome of buprenorphine initiation within 90 days of screening and was also stratified a priori by stimulant use. LR for retention to 60 days could not be performed due to 100% retention in one group. LR for the composite outcome of initiation within 90 days of screening *and* retention to 60 days was performed using the same stratification as for the initiation outcome. In addition, interaction terms for treatment group membership and recent stimulant use were included in separate fitted models, and likelihood ratio tests for interaction were performed. Analyses were conducted using the statistical package Stata SE 14.2 (STATACorp LLC, College Station, TX).

Multivariate models were a priori adjusted for: age, race, sex, partnered status, homelessness, and history of prior substance use treatment. Age, race, and sex were included for face validity. Recent homelessness and partnered status were included because of heightened need for support among unhoused patients and patients lacking social supports (Alford et al., 2007). Finally, history of prior opioid agonist treatment and history of exclusively non-agonist substance use treatment were also included because they have been implicated as negative predictors of buprenorphine treatment success and retention (Dreifuss et al., 2013; Simon et al., 2017). Cases missing values for any covariates in the model were excluded from multivariate analysis.

3. Results

Of 112 patients who completed screenings under the high-threshold condition, 96 met inclusion criteria. Reasons for exclusion included taking currently prescribed buprenorphine at the time of screening (n = 11), immediate referral to higher level of care (n = 3), an ambiguously documented path to buprenorphine initiation (n = 1), and insufficient screening data regarding recent stimulant use (n = 1). In the low-threshold group, 72 of 85 screened patients met inclusion criteria, with reasons for exclusion including: taking currently prescribed buprenorphine at the time of screening (n = 5), initiation not occurring in outpatient setting (n = 2), duplicate patient (n = 1), ambiguously documented paths to buprenorphine initiation (n = 4), and insufficient follow-up data (n = 1).

Baseline characteristics of high- and low-threshold groups are presented in Table 2. Both treatment groups were predominantly male and identified as white race. Between a quarter and a third of patients had experienced homelessness in the past 3 months. Amphetamine/methamphetamine use was approximately twice as common as cocaine use in both groups. Roughly half of patients in both groups had previously been treated with buprenorphine or methadone.

Among all patients initiated within 90 days of screening, the mean time to initiation was 18 days with an interquartile range of 13–33.5. Fig. 1 presents chi-squared comparisons of binary initiation and retention outcomes stratified by recent use of stimulants. There was a significantly higher proportion of patients with recent stimulant use who were initiated in the low-threshold period: 24 of 35 (69%) compared to 17 of 49 (35%) in the high-threshold period (p = 0.002, Fig. 1a). However, retention to 60 days was significantly lower among patients with recent stimulant use in the low-threshold period at 15 of

Table 1
Comparison of treatment conditions.

High-threshold conditions	Low-threshold conditions
Urine sample free of cocaine and amphetamine/methamphetamine required prior to initiation	Urine sample positive for cocaine or amphetamine/methamphetamine does not delay initiation
Urine samples usually collected on the day of the first NCM visit	Staff makes effort to collect urine sample as soon as possible prior to provider visits
Initial physician visit usually occurs on a later date than first NCM visit	Larger pool of waivered providers allows physician and NCM visits to be frequently scheduled on the same day
Majority of patients required to pass through the visits between screening and initiation in strict order	Many patients proceed through atypical pathways to initiation (e.g. see the physician before they are screened and do not require another physician visit before initiation)
Most patients undergo observed, in-office buprenorphine initiation	Most patients undergo unobserved buprenorphine initiation at home/out-of-office

Table 2
Patient characteristics at initial screening in high- and low-threshold periods.

Variable	High-threshold (n = 96)	Low-threshold (n = 72)	P value
Age	39 (14)	41 (14)	0.485
Female	30 (31%)	25 (35%)	0.635
Race			0.000
White	76 (79%)	47 (65%)	
Black/African American	7 (7%)	25 (35%)	
Alaskan Native/American Indian	3 (3%)	0 (0%)	
Asian/Native Hawaiian/Pacific Islander	3 (3%)	0 (0%)	
Other or missing	7 (7%)	0 (0%)	
Ethnicity			0.217
Hispanic/Latinx	8 (8%)	3 (4%)	
Not Hispanic/Latinx	70 (73%)	61 (85%)	
Missing	8 (8%)	8 (11%)	
Partnered	31 (32%)	27 (38%)	0.482
Homeless in past 3 months	29 (30%)	20 (28%)	0.603
Missing	4 (4%)	0 (0%)	
Recent heroin use	69 (72%)	54 (75%)	0.707
Missing	7 (7%)	0 (0%)	
Recent amphetamine/methamphetamine use	37 (39%)	26 (36%)	0.747
Recent cocaine use	15 (16%)	13 (18%)	0.721
Missing	2 (2%)	0 (0%)	
Prior substance use treatment, with no buprenorphine or methadone	22 (23%)	16 (22%)	0.740
Missing	6 (6%)	0 (0%)	
Prior buprenorphine or methadone treatment	53 (55%)	35 (49%)	0.285
Missing	3 (3%)	0 (0%)	

Values reported as frequency (percentage) or mean (standard deviation).
P values reported from Student's *t*-test (for age) and from Pearson's chi-squared test (for categorical variables).

24 (63%) compared to 17 of 17 (100%) in the high-threshold period (p = 0.004, Fig. 1b). In contrast, neither of these outcomes differed significantly among patients without recent stimulant use (Fig. 1a and b). When examining the composite outcome of initiation and retention to 60 days, there appeared to be no significant differences between high- and low-threshold periods for either the stimulant-using or non-stimulant-using patients (Fig. 1c).

Multivariate logistic regression models for initiation within 90 days, stratified by recent stimulant use, are reported in Table 3. There were 79 complete cases without recent stimulant use and 75 with recent stimulant use. This included 82 of 96 total patients in the high-threshold group and 72 of 72 total in the low-threshold group. We attribute this difference in proportions to improved data collection later in the life of the program. The likelihood ratio test for interaction between treatment group and recent stimulant use was significant at p = 0.004. After adjustment for covariates in patients with recent stimulant use, low-threshold conditions remained associated with greater odds of buprenorphine initiation (aOR = 7.01, 95% CI = 2.26–21.80). Implementation of lower thresholds did not significantly affect initiation within 90 days in patients without recent stimulant use. White race, recent homelessness, and prior buprenorphine or methadone treatment were also associated with lower odds of treatment initiation among patients without recent stimulant use, whereas only younger age was associated with initiation in those with recent use.

Because high-threshold conditions perfectly predicted 60-day retention among patients with recent stimulant use (Fig. 1b), logistic regression analysis of this outcome was not attempted. Instead, the composite outcome of initiation and retention is addressed in Table 4. Again, complete cases included 79 without recent stimulant use and 75 with recent stimulant use. The likelihood ratio test for interaction between treatment group and recent stimulant use with respect to this outcome did not reach significance at p = 0.227. Furthermore, the

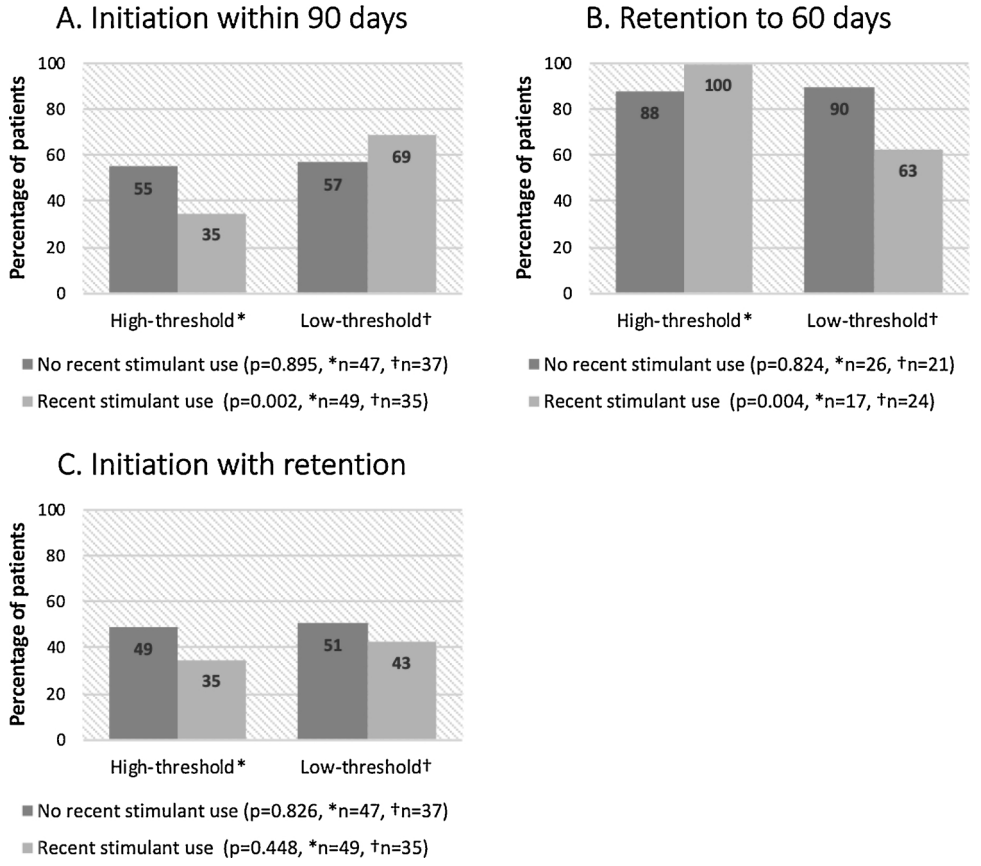

Fig. 1. Treatment progression through initiation and early retention, stratified by recent stimulant use and compared by high/low-threshold group.

Table 3
Adjusted odds of initiation within 90 days, by recent stimulant use.

Variable	No recent stimulant use (n = 79)		Recent stimulant use (n = 75)	
	Adjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Implementation of lower thresholds	0.36 (0.09–1.34)	0.128	7.01 (2.26–21.80)	0.001
Female	0.32 (0.06–1.72)	0.185	0.84 (0.19–3.62)	0.811
Age	1.00 (0.96–1.04)	0.826	1.05 (1.01–1.10)	0.028
White race	0.07 (0.01–0.66)	0.020	1.50 (0.29–(7.70)	0.627
Homeless in past 3 months	0.10 (0.02–0.52)	0.006	0.89 (0.28–2.85)	0.840
Partnered	0.35 (0.10–1.18)	0.091	1.34 (0.41–4.41)	0.631
Prior buprenorphine or methadone treatment	0.17 (0.03–0.87)	0.034	0.32 (0.08–1.39)	0.129
Prior substance use treatment, with no buprenorphine or methadone	0.56 (0.10–3.19)	0.515	0.65 (0.13–3.32)	0.609

OR = odds ratio.

composite outcome of initiation and retention was not significantly associated with implementation of lower thresholds in either stimulant use stratum. Covariates negatively associated with the outcome included recent homelessness among those without recent stimulant use and prior buprenorphine or methadone treatment in both strata. Older age was positively associated with the outcome among those with recent stimulant use.

4. Discussion

These study results suggest that our efforts implementing clinic procedures and policies to lower entry thresholds in buprenorphine treatment were successful in increasing the odds that patients using stimulants would initiate treatment, but there remain challenges in retaining such patients. Only the stratum of patients with recent stimulant use exhibited significantly different initiation outcomes. Furthermore, multivariable analysis revealed significant interaction between recent stimulant use and low-threshold conditions. These points argue that removal of the stimulant abstinence requirement was primarily responsible for observed increases in buprenorphine initiation. However, the additional programmatic changes outlined in Table 1, designed to increase flexibility and expediency, merit further consideration. These changes were consistent with key characteristics of low-threshold opioid agonist treatment such as flexible admission criteria, individualized treatment design, and unsupervised drug self-administration (Kourounis et al., 2016). The increased proportion of patients without recent stimulant use who were retained at least sixty days under low-threshold conditions may in part reflect these changes. Other modifications to provider and staff behavior resulting from progressive experience may also have contributed.

Interestingly, prior history of opioid agonist treatment (buprenorphine or methadone) was negatively associated with odds of treatment initiation among patients without recent stimulant use, with a similar but non-significant trend among those with recent stimulant use (Table 3). With respect to the composite outcome of initiation and retention, this negative association was present in both stimulant use strata (Table 4). These findings are consistent with previous research in our clinic (Simon et al., 2017) and by others (Dreifuss et al., 2013). It is likely that patients who are serially unsuccessful with opioid agonist treatment have persistent or unaddressed barriers to success. This would suggest that in treating such patients, proactive inquiry into causes of historical treatment failure is especially important.

The substantial proportion of patients with recent stimulant use who were initiated but not retained in treatment for 60 days under the low-threshold conditions (Fig. 1b) present a challenging clinical scenario. This is reflected in the fact that the association between low-threshold conditions and the composite outcome of initiation and retention did not reach significance (Table 4). We doubt programmatic changes caused the decrease in retention among patients with recent stimulant use. Instead, we suspect many patients who were not retained under low threshold conditions would never have been initiated on buprenorphine prior to change of the stimulant use policy. These patients likely possessed vulnerabilities, such as more severe stimulant use, which put them at higher risk for drop-out/non-retention.

Several studies report cocaine use ranging from 34% (Kumari et al., 2016) to 39% of buprenorphine patients (Cunningham et al., 2013), and Marsch et al. (2005) reported a prevalence of cocaine dependence up to 47%. Of these studies, all conducted on the East coast of the United States, only Kumari et al. (2016) reports on amphetamine use, at 2%. In our sample, recent history of amphetamine/methamphetamine use occurred with similar prevalence to that of cocaine in the aforementioned studies at 39% in the high-threshold group and 36% in the low-threshold group. However, including cocaine use meant that a somewhat higher proportion, approximately 49%, of all patients in our study had recently used stimulants. While some prior studies have reported that patients concurrently using opioids and cocaine have decreased retention in buprenorphine treatment (Haddad et al., 2013; Kumari et al., 2016), to our knowledge no study has previously described a similar phenomenon among a patient sample in which amphetamine/methamphetamine use predominates. We suspect geographic and temporal trends in the prevalence of stimulant use contribute to this gap in the literature (Maxwell and Rutkowski, 2008).

Table 4
Adjusted odds of achieving both initiation within 90 days and retention to 60 days thereafter, by recent stimulant use.

Variable	No recent stimulant use (n = 79)		Recent stimulant use (n = 75)	
	Adjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Implementation of lower thresholds	0.50 (0.15–1.75)	0.280	2.15 (0.72–6.41)	0.168
Female	0.37 (0.07–1.90)	0.236	1.06 (0.25–4.51)	0.936
Age	1.00 (0.96–1.04)	0.930	1.05 (1.01–1.10)	0.016
White race	0.16 (0.02–1.25)	0.081	1.23 (0.25–6.17)	0.801
Homeless in past 3 months	0.12 (0.02–0.62)	0.012	0.89 (0.28–2.81)	0.841
Partnered	0.52 (0.17–1.59)	0.249	0.76 (0.23–2.54)	0.659
Prior buprenorphine or methadone treatment	0.20 (0.04–0.92)	0.039	0.21 (0.05–0.88)	0.033
Prior substance use treatment, with no buprenorphine or methadone	0.22 (0.04–1.11)	0.067	0.12 (0.01–1.81)	0.125

OR = odds ratio.

Despite tremendous effort, there are no consistently effective pharmacotherapy options for the treatment of stimulant use disorders. One evidence-based intervention for co-occurring cocaine and opioid use disorders is contingency management (Schottenfeld et al., 2005); however, this is a resource-intensive strategy that may not be feasible in many settings.

Unfortunately, the rate of successful treatment initiation among persons without stimulant use was not significantly changed by implementation of low-threshold conditions and remained around 55%. There remains significant room for improvement in engaging even patients without recent stimulant use. Other authors have suggested on-demand access to buprenorphine, utilizing patient navigators, and other novel means of supporting patients seeking treatment (Bassuk et al., 2016; Bhatraju et al., 2017). Treatment access might also be improved by an increased number of available providers; subsequent to this study, our program has increased the number of waivered providers, including residents and non-physician advanced practice providers, though the effects of those changes are beyond the scope of this paper. Our rates of retention, although comparable to what has been reported in other studies (Bhatraju et al., 2017; Haddad et al., 2013), also reflect major opportunities for improvement. Elucidating the most important obstacles to retention among patients who use stimulants may be an area in which more qualitative research would be helpful. Even with short durations of treatment, initiating more patients may still offer benefit. A recent large observational study reported an association between receipt of buprenorphine therapy after a nonfatal opioid overdose event and reduced opioid-related and all-cause mortality in the following 12 months (Larochelle et al., 2018). Patients in that study were retained in buprenorphine treatment for a median of just 4 months (Larochelle et al., 2018).

This study has several important limitations. The modest sample size of 168 patients limited study power, and results should be interpreted accordingly. The clinic implemented several changes to provide "low-threshold" care, and therefore we are unable to tease out the relative effects of those changes. However, given that we observed differential effects by patient stimulant use, we suspect the most important change was removal of the stimulant abstinence requirement. Another limitation is that the uptake in clinic policy changes may have occurred before or after the date we selected to define the start of the "low-threshold" conditions. That date was selected as it marked a discussion with providers; after this there was consensus, and the policy requiring stimulant-free urine was changed. It was also around the time that the other described changes in clinic procedures were enacted. However, some changes in practice may have preceded or lagged behind that date. In theory, this should bias our results to the null.

The follow-up period for retention, at 60 days, was limited. Previous studies have demonstrated that the rate of dropout is higher in the first 30 days than subsequently (Hser et al., 2014), with approximately half of dropouts over the course of a year occurring in the first month (Soeffing et al., 2009). Thus, we believe the retention outcomes reported in this study are likely to be predictive of longer-term trends. However, it remains possible that longer-term retention is not impacted by stimulant use in the same way as shorter-term retention. Additionally, we were unable to examine outcomes for patients who did not initiate treatment, and we lacked a way to reliably capture overdose events, as chart review may have missed events outside the system.

Another limitation of this study is its reliance on observational data. Data collected retrospectively via chart review cannot match the comprehensiveness and integrity of prospectively gathered data from research participants. There may have been unaccounted-for temporal trends that could explain our findings. However, using data from a "real-world" setting can also be perceived as a strength of the study. Finally, data were collected only from patients at a single program site that followed a specific model (NCM). This may limit generalizability to buprenorphine treatment settings that do not utilize such a model. However, we suspect that adopting the major change in our "low-threshold" approach (not requiring stimulant abstinence) would have similar results in other settings.

5. Conclusion

Low threshold admissions criteria have the potential to increase successful engagement of patients who use stimulants. Demonstration of this effect in a randomized trial or in other populations would provide stronger support for restructuring buprenorphine programs accordingly. Further research is also needed to identify supports and interventions that improve retention in treatment for such individuals.

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Bjorn E. Payne: Study Design, Data Collection, Data Analysis, Drafting of Manuscript.

Jared W. Klein: Study Design, Data Analysis, Drafting of Manuscript.

Claire B. Simon: Data collection, Revision of Manuscript.

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Conflicts of interest

The authors have no conflicts of interest to disclose.

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