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Predicting Outpatient Treatment Entry Following Detoxification for Injection Drug Use: The Impact of Patient and Program Factors

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Abstract

This paper examines variables that predicted outpatient treatment entry within six months of residential detoxification. Patient data were collected from 632 injection drug users enrolled in a randomized trial conducted at 8 detoxification programs within the National Drug Abuse Treatment Clinical Trials Network (CTN) with follow-up assessments conducted at 2, 8, 16, and 24 weeks. Detoxification program characteristics were collected during this study and from a survey of CTN treatment organizations. Survival analysis found that estimated proportions of reported outpatient treatment entry varied across sites from .06 to .72. A model-building approach determined variables significantly associated with outpatient treatment entry. The best predictive model contained five program-level variables: accreditation, fewer beds, longer stays, shorter distance between detoxification and outpatient unit, and larger city population. Results suggest the importance of detoxification program characteristics in facilitating further treatment and the need for systems modifications to improve continuity of care.

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1. Introduction

Many substance dependent individuals enter the treatment system for detoxification, seeking assistance for substance withdrawal, followed, ideally, by transition to further treatment. In 2005, there were 409,731 detoxification admissions in the United States, accounting for 21% of all substance abuse treatment admissions (Substance Abuse and Mental Health Services Administration, 2007). Evidence is clear that those who transition to longer term treatment following detoxification have better outcomes, including reduced drug use (Chutuape, Jasinski, Fingerhood & Stitzer, 2001; Ghodse et al., 2002), reduced HIV risk behavior (Longshore, Hsieh, Danila, & Anglin, 1993) and fewer re-admissions to detoxification (Daley, Ageriou & McCarty, 1998; Mark, Vandivort-Warren & Montejano, 2006). Despite the importance of treatment after detoxification, there is often a gap in the continuum of care. Review of national hospital data from 1992 to 1997 showed that the percentage of patients receiving inpatient or residential treatment following detoxification dropped from 38.9% to 21.1% (Mark et al., 2002). Other studies have shown participation in treatment after detoxification ranging from a low of 26% (McCusker, Bigelow, Luippold, Zorn & Lewis, 1995) to a high of only 41% (Chutuape et al., 2001).

Continuity of care has been identified as an important measure of treatment quality. For example, the Washington Circle group (Garnick et al., 2002) identified treatment initiation (i.e., inpatient or outpatient AOD admission with an index service and any additional AOD services within 14 days) as one of three measures assessing quality of service delivery. Originally developed for private health plans, the measures were adapted to public sector programs and include a measure of continuity of care after detoxification (Garnick, Lee, Horgan, & Acevedo, 2009). Results across six states ranged from only 19% to 59% of patients who participated in a follow-up service within 14 days of discharge from detoxification. Whether examined from the perspective of individual patient outcomes or as measures of program performance, the data concur; for many patients, treatment ends at discharge from detoxification. When such is the case, substance use often resumes (Broers, Giner, Dumont, & Mino, 2000).

Improving rates of transition from detoxification to ongoing care is an important quality improvement goal. Efforts to achieve this goal should include development and testing of specific treatment interventions, as well as programmatic systems that enhance treatment transition. Identifying factors that predict successful transition can inform innovation in both of these areas. Limited research regarding continuity of treatment after detoxification has generally focused on patient characteristics. Kleinman, Millery, Scimeca and Polissar (2002) found that being homeless, on parole, and engaging in drug use for less than 20 years predicted residential treatment participation after detoxification for heroin or cocaine dependence. Cognitive measures of self-efficacy for treatment and beliefs favoring treatment entry were also predictive of treatment entry (Kleinman et al., 2002). Severity of drug use and medical problems were negative predictors of transfer to residential treatment after detoxification, primarily for heroin and/or cocaine (Franken & Hendriks, 1999). Shin, Lundgren, and Chassler (2007) found that younger (i.e., 18-25) injection drug users (IDUs), those with less education, men, the uninsured, Blacks, and Latinos were significantly less likely to continue care after detoxification. McCusker et al. (1995) found that longer length of stay in a 21-day detoxification program predicted transfer to residential treatment, although overall rate of transfer was only 19% of patients. Studying a sample of insured patients, Mark et al. (2002) examined a mix of patient and payment factors; being a woman, insured through a behavioral health "carve out" plan and lower cost share for patients were associated with higher treatment participation following detoxification. A few patterns emerge from these results and suggest the importance of payment factors, longer lengths of stay, and drug problem severity as potential predictors.

Research on program variables that impact the transition from detoxification to further treatment has received scant attention. Such variables may range from structural characteristics, such as detoxification program size and location, to variations in treatment practices. Two observational studies examined how detoxification treatment practices enhanced by case management affected transitions to further treatment. Schwartz, Baker, Mulvey, and Plough (1997) studied outcomes from the Target Cities Project in Boston and found that case managed, detoxification clients were 1.66 times more likely to enter further treatment than non case-managed clients. Similarly, case management services provided in the public treatment addiction system in Philadelphia for up to a year following detoxification resulted in a 55% reduction in detoxification only admissions and a 70% increase in treatment participation (McClellan, Weinstein, Shen, Kendig & Levine, 2005).

Two studies examined the influence of treatment practices on length of stay in detoxification. Saitz, Friedman, and Mayo-Smith (1995) found that alcohol detoxification programs using fixed medication schedules reported longer lengths of stay than those reporting medicating as necessary. Jonkman, McCarty, Harwood, Normand, and Caspi (2005) studied the impact of both patient and program variables on length of stay in alcohol and drug detoxification. Program size had the greatest impact on length of stay of all the factors examined; length of stay was more than 40% longer in programs with at least 35 beds. One study was found that examined the impact of non-treatment related, program variables on transfer from detoxification to further treatment; program location, specifically, the close proximity of detoxification and rehabilitation units, was significantly associated with transition to post-detoxification treatment (Ross & Turner, 1994).

The present study examines both patient and detoxification program variables that predict outpatient treatment entry following detoxification for injection drug use (IDU). The data were collected from a multi-site, randomized trial within the National Drug Abuse Treatment Clinical Trials Network (CTN). The trial, "HIV/HCV risk reduction interventions in drug detoxification and treatment settings" (Risk Reduction Study), tested three interventions designed to reduce HIV/HCV risk behavior and increase treatment entry for IDUs in residential detoxification: 1) treatment as usual (TAU), 2) a single session, therapeutic alliance intervention (TA) conducted by outpatient counselors aimed at facilitating outpatient treatment entry and, 3) a 2-session, counseling and education, HIV/HCV risk reduction intervention (C&E). Both experimental interventions were added to TAU and participants were randomized to one of the three conditions within each site. The study targeted outpatient treatment entry due to the immediate availability of outpatient services in many programs, including those participating in the study, in contrast to less available residential treatment. Potential participants definitively seeking residential treatment were excluded from the study.

Primary results showed that participants in all three conditions significantly reduced drug injection and related risk behavior during the six-month follow-up period and that reporting at least one treatment visit within two months of detoxification predicted a positive outcome (Booth et al., 2009). Secondary results found that the probability of reporting outpatient treatment entry during the follow-up period was significantly greater for TA participants than for those receiving TAU only (Campbell et al., 2009). In addition, there were large differences among sites in reported outpatient treatment entry regardless of intervention condition (i.e., a site main effect). The sites, located in six states across the U.S. in both small and large population centers, differed on an array of patient and program characteristics. In order to understand the significant site differences in outpatient treatment entry outcomes, we examined both participant characteristics and detoxification program variables to identify those which differentiated sites and best predicted outpatient treatment entry.

2. Methods

2.1 Study Design

This investigation used data from two sources: 1) The Risk Reduction Study provided patient participant data at baseline and follow-up, as well as detoxification unit information; and 2) The CTN Survey Study, a descriptive survey of treatment programs within the CTN (McCarty et al., 2007; McCarty et al., 2008), provided treatment unit data describing levels of care, ancillary services, work force, and patient, case mix information.

2.2 Sites

The Risk Reduction Study was conducted from 2004 through 2006 at eight residential detoxification centers participating in the CTN. All CTN community treatment programs with residential detoxification units serving IDUs and outpatient treatment services within their organization were invited to participate; eight sites volunteered and were included in the study. All detoxification sites were non-hospital affiliated units of community treatment programs. The detoxification units ranged in size from 16 to 100 beds; usual length of stay in detoxification, as reported by program managers, ranged from 1.5 to 8.5 days. The CTN Survey Study was conducted at these treatment programs between February 2002 and August 2004.

2.3 Patient Participants

Risk Reduction Study participants were adult (i.e., 18 and over) IDUs recruited during detoxification treatment, with a recent history of injection drug use (as determined by self-report and signs of recent drug injection or the ability to correctly describe injection procedures), eligible for outpatient treatment and not definitively requesting residential treatment. Patients ($n = 698$) were evaluated for eligibility following completion of informed consent and 632 were randomized. Participants were paid with \$25.00 –\$35.00 gift cards for attending follow-up assessments which were conducted at approximately 2, 8, 16 and 24 weeks. Follow up rates were 70%, 63%, 60% and 63%, respectively.

2.4 Human Subjects Protections

Oregon Health & Science University Institutional Review Board (IRB) reviewed and approved study procedures for both the Risk Reduction Study and the CTN Survey Study. The IRB at the University of Colorado Denver approved the Risk Reduction Study protocol. Local IRBs for each of the participating sites also reviewed and approved both studies.

2.5 Data Collection Instruments

Patient-level variables used in this analysis were taken from instruments administered for the Risk Reduction Study. See Campbell et al. (2009) for a more complete description of:

1. HIV Risk Behavior Survey (RBS) – measured HIV and HCV risk behaviors in the areas of drug use and sex within the previous 30 days. Baseline responses regarding types of drug injected within the last 30 days were used for this analysis.
2. Demographics Questionnaire - developed for use by the CTN to assess age, ethnicity/ race, and gender administered at baseline.
3. Participant Locator Form - used to obtain information to locate participants for follow-up interviews including address, phone, friends, family, places for shelter, and usual gathering spots.
4. Addiction Severity Index- Lite (ASI) (McLellan et al., 1992; McLellan, Luborsky, Woody & O'Brien, &, 1980) - assesses drug/alcohol use and related behavior in seven life areas over the respondent's lifetime and within the past 30 days. Baseline

responses regarding marital status, employment, education, criminal justice involvement, living arrangements and medical problems were used for this analysis.

5. Timeline Follow-Back Assessment of Treatment Behavior (TFB) – the TFB, modeled after Sobell and Sobell's (1996) Timeline Follow-Back Calendar, was used to measure self-reported days of substance abuse treatment attendance, including outpatient, inpatient, residential, methadone maintenance/other opiate replacement, and 12-step meetings, since the last assessment. The current analysis used reported attendance at outpatient treatment sessions. Date of first reported session was considered date of outpatient treatment entry.
6. Services Received Questionnaire (SRQ) – used at the 2-week follow-up to assess services that participants reported receiving during detoxification. Questions regarding HIV risk assessment and treatment referral post-detoxification were used for this analysis.
7. Stage of Change Questionnaire (SOC) for quitting drug use –the SOC was a modification of the Motivation Scales, including Drug Use Problems, Desire for Help, and Treatment Readiness from the data instruments developed by Simpson et al. (1997). SOC stages are: pre-contemplation, contemplation, preparation, action, maintenance and unstaged (i.e., responses were invalid). Baseline SOC responses were used for the current analysis.

Program-level variables used in this analysis were collected as follows:

1. Detoxification program size (i.e., number of beds), location and usual length of stay – This information was collected from program administrators at the completion of the Risk Reduction Study.
2. Treatment Unit Survey (TUS) - This survey was completed by program administrators at treatment unit sites for the CTN Survey Study. It collected information about program accreditation/licensure, range of primary and ancillary treatment services, staffing, and scales to assess treatment milieu and philosophy. See McCarty et al., (2008) for a thorough description of the TUS.

2.6 Data Analysis

2.61 Patient and Program Variables—Patient-level variables obtained from assessment of Risk Reduction Study participants are listed in Tables 1a and 1b. They included demographic variables, criminal justice involvement, living arrangement, stage of change, patient report of services received during detoxification and alcohol/drug use variables. Program-level variables included: (a) number of years the detoxification unit had been in operation; (b) usual length of stay in detoxification; (c) number of detoxification beds; (d) the combined total of primary services (up to a possible 12 including detoxification, residential, halfway house, therapeutic community, outpatient, etc.) and ancillary services (up to a possible 22 including case management, vocational services, primary medical care, prevention services, etc.) offered at the treatment unit of which the detoxification program was considered a component, as defined by each treatment organization; (e) accreditation (i.e., Commission on Accreditation of Rehabilitation Facilities, Council on Accreditation of Services for Families and Children, Joint Commission on the Accreditation of Health Care Organizations, and National Committee for Quality Assurance) in addition to state/county licensure at the treatment unit of which the detoxification program was considered a component, as defined by each treatment organization (yes vs. no) ; (f) distance (≤ 1 mile vs. > 1 mile) between detoxification facility and outpatient treatment unit associated with the same treatment organization (distance was averaged if the organization had more than one outpatient unit); and (g) population of the city in which detoxification facility was located.

2.62 Outpatient Treatment Entry Outcome—The primary outcome measure was first outpatient treatment entry during the six month follow-up period, determined using self-reported dates of treatment services from the TFB. Patients who did not report initiation of outpatient treatment were censored at time of last follow-up visit or at six months.

2.63 Statistical Analysis—Differences in patient characteristics among study sites were assessed using 2-tailed, χ^2 bivariate analyses. To examine differences in outpatient treatment entry across sites, the estimated proportions of outpatient treatment entry within six months were determined using the Kaplan-Meier survival analysis method; this method takes into account participants' different lengths of follow-up observation due to attrition. Ninety-one participants provided no follow-up data and were censored at day one; 142 additional participants were lost to follow-up before entering outpatient treatment and were censored at their last known date of contact.

A two-stage model-building approach was conducted to determine which patient-level and detoxification program-level variables were significantly associated with outpatient treatment entry. First, patient-level variables were examined univariately using Cox proportional hazards regression. All patient-level predictors with $p \leq .05$ were entered into a forward stepwise model selection process; entry criteria were $p \leq 0.10$; exit criteria were $p \geq 0.15$. The resulting patient-level variables constituted the patient-level model. Subsequently, all program characteristics were entered into the reduced patient effects model, and examined one at a time. All program-level predictors with $p < .05$, in addition to the reduced-model patient effects, were then entered into a forward stepwise model selection process, utilizing the entry and exit criteria described above. The resultant model contained both patient- and program-level variables. The Akaike Information Criterion (AIC) statistic, which is a measure of model fit, was used to compare the patient-level model with the combined model. A lower AIC score indicates better model fit, although the AIC value itself is not meaningful. Finally, a frailty effect for site was added to the final proportional hazards model in order to account for the potential correlations among patients within a site.

To investigate potential biases due to entry into treatment other than outpatient, we conducted a sub-sample analysis, excluding participants who only entered methadone maintenance, residential, and/or inpatient treatment ($n=96$). Removal of these participants eliminated equating the outcome of no reported treatment with the outcome of reporting formal treatment other than outpatient. The analysis on the remaining 536 who entered outpatient treatment only, outpatient treatment plus a combination of other treatments types, or no formal treatment exhibited results similar to the full sample analysis; therefore results are not shown.

All analyses were performed using SAS software, Version 9.2 (SAS Institute, Inc., Cary, NC, 2008) and STATA, Release 11 (StataCorp, College Station, TX, 2009). Reported p values are two-tailed.

3. Results

3.1 Study Participants

Demographic and drug use characteristics of the study sample are shown in Tables 1a and 1b for each program site. Participants averaged 36 years of age with a range from 19 to 65. Approximately 24% were women, 8% were Black, 10% were multi-racial, and 9% reported Latino or Hispanic ethnicity. Overall, 82% of participants scored in the preparation stage for quitting drug use, and 14% were in the pre-contemplation or contemplation stages at baseline. Over 80% reported injecting heroin within the past 30 days, nearly 60% reported stimulant injection, and 38% reported injecting “speedballs”, a combination of heroin and stimulants. Approximately 36.7% reported more than 10 days of alcohol use within the past 30 days. There

were 18.6% who reported more than 10 prior drug detoxifications and 12.5% who reported more than 10 prior alcohol detoxifications. A majority of participants were not married, had no criminal justice involvement, were living in stable arrangements, and had no chronic medical problems. There were significant differences among study sites on all participant characteristics ($p < 0.05$), except marital status (See Tables 1a and 1b).

3.2 Program Characteristics

Detoxification site characteristics are shown in Table 2. Sites were located in cities with population ranging from 26,000 to 576,000, were in operation from 1 to 36 years, had from 16 to 100 beds with usual lengths of stay ranging from 1.5 to 8.5 days, and reported from 2 to 15 primary and ancillary services. Five of eight sites were accredited in addition to state/county licensure, and 50% had outpatient treatment units located within one mile of the detoxification facility.

3.3 Outpatient Treatment Entry

Table 3 shows the cumulative frequency, percentage, and estimated proportion of patients initiating outpatient treatment within six months for each study site. The overall estimated proportion was 0.378, and ranged from 0.064 to 0.717 across sites. There was a significant difference among sites in proportion of patients who entered outpatient treatment ($p < 0.0001$). As indicated in Table 3, there was no significant difference among sites in loss to follow up ($p = 0.9147$).

3.4 Multivariate Analysis/Model-Building

Six patient-level variables were associated with time to outpatient treatment entry in the univariate analysis, including stage of change, number of previous alcohol detoxifications, heroin use in the last 30 days, living arrangements, criminal justice involvement, and reporting that detoxification staff recommended treatment ($p < 0.05$). Of these six, all but living arrangements were selected in stepwise regression. In Model 1, the patient-level model, patients who had treatment recommended by a detoxification staff member were more likely to have entered outpatient treatment than those with no treatment recommendation; the estimated hazard ratio was 1.418 (95% CI: 1.042 – 1.931), indicating that patients with a treatment recommendation had a 42% higher enrollment rate in outpatient treatment. There was a trend toward higher likelihood of outpatient treatment entry for patients who had used heroin in the past 30 days, had criminal justice involvement, and had fewer past alcohol detoxifications ($p < 0.10$); and a trend toward lower likelihood of entering outpatient treatment for patients in the contemplation/pre-contemplation stage or the “unstaged” category compared to patients in the preparation stage ($p < 0.10$).

Six program-level variables were associated with time to outpatient treatment entry, adjusting for patient-level variables in Model 1, including (a) additional accreditation, (b) number of services, (c) usual length of stay, (d) number of beds, (e) miles from detoxification to outpatient treatment unit, and (f) city population ($p < 0.05$). Model 2, with a frailty effect for site, is the final, reduced effects model that was obtained from combining the above six program-level variables with Model 1 in a stepwise Cox regression model. According to this model, patients who were from programs with a longer length of stay had higher rate of outpatient enrollment. The estimated hazard ratio was 1.329 (95% CI: 1.132 – 1.562), indicating that for each one-day increase in a program's usual length of stay, patients had a 33% increased rate of entering outpatient treatment. For every 10,000-person increase in city population, patients had 1.04 (95% CI: 1.022-1.058) times the likelihood of entering outpatient treatment; for every 1-bed increase in a program's number of beds, the likelihood of treatment entry decreased by 3% (HR: 0.972, 95% CI: 0.961-0.984). More notably, the rate of treatment entry increased more than 3-fold for patients from programs with additional accreditation compared to no additional

accreditation (HR: 3.166, 95% CI: 1.331 – 7.53); and increased nearly 2.5-fold for patients who were at a detoxification unit with an outpatient treatment unit located less than or equal to 1 mile from the detoxification facility, in contrast to greater than 1 mile away (HR: 2.407, 95% CI: 1.376 – 4.211). There was a trend toward higher likelihood of entering outpatient treatment for patients who had criminal justice involvement compared to those who had none ($p=0.063$). See Table 4 for complete results of Models 1 and 2. The frailty effect for site was non-significant ($p=0.50$), indicating that heterogeneity due to clustering of patients within sites was largely accounted for by the program-level variables included in the model. Results including the frailty term are reported to account for unknown and otherwise unaccounted for correlations of patients within sites. To compare the model fit between the two models, the AIC statistic for each model was obtained. Model 2, with the lower AIC value, has a better fit to the data than Model 1, with the higher AIC value.

4. Discussion

In the present study only 28.3% of the 632 IDU participants reported 1 or more outpatient visits during the six month follow-up period following residential detoxification, while 15.2% entered some other formal treatment only, and 56.5% reported no formal treatment or were lost to follow-up. Differences across program sites were large; the estimated proportion of reported outpatient treatment entry by six months ranged from .06 to .72. Sites also differed on many of the patient characteristics that were examined. However, when we evaluated both patient and detoxification program-level variables to identify those which best predicted outpatient treatment entry, our final model included five program related variables (additional accreditation, number of beds, usual length of stay, distance to outpatient program and city population); only one patient-level variable (criminal justice involvement) trended toward significance. Most studies of predictors of continuity of care after detoxification have focused on individual patient characteristics. Current results point to the influence of detoxification program variables in facilitating outpatient treatment after residential detoxification for IDUs and the need for studying them further.

It is possible that some of the significant program-related predictors in the present study were indirect indicators of quality of care. For example, participants from programs that had accreditation in addition to required licensure were over 3 times as likely to report outpatient treatment entry; this may indicate the presence of quality services required to achieve and maintain that accreditation. In addition, we found that patients from detoxification programs with fewer beds had modestly higher rates of entry into outpatient care. Perhaps a smaller number of beds increases the likelihood of receiving more staff attention or services. The positive impact of longer length of stay has been a robust finding for improved outcomes in outpatient and residential treatment (Hubbard et al, 1997; Stark, 1992) as well as detoxification (McCusker et al., 1995). The current finding, employing usual, programmatic length of stay reported by program managers as the variable rather than individual length of stay, supports this.

The two remaining detoxification program-level variables were geographic. Participants in detoxification programs in larger cities were more likely to report outpatient treatment entry, perhaps due to the greater availability of such services, access to public transportation, and/or greater likelihood that they remained in a larger metropolitan area after detoxification. Distance between detoxification units and outpatient programs within the same treatment organization was also a significant predictor, replicating a finding by Ross and Turner (1994). It may have a common sense explanation; the shorter the distance, the easier to travel to new treatment. Alternatively, having detoxification units in close proximity to outpatient units may facilitate greater staff and program coordination, which, in turn, may influence continuity of care. Criminal justice involvement (including probation, parole, incarceration or awaiting charges

in the last 30 days) was the one patient factor that trended toward significance in our final predictive model. This finding is consistent with others; Kleinman et al. (2002) found that being on parole was a significant predictor of transition from detoxification to residential treatment.

Our study examined patient variables for 632 participants and detoxification program variables for the 8 sites at which they received detoxification. Limitations of the study include drawing conclusions from a program sample size of 8. This small sample size and associated degrees of freedom for multivariate analysis limited the ability to examine variation on multiple program characteristics (Jonkman et al., 2005). Results associated with program characteristics should be interpreted with caution. Additionally, this was an exploratory study. An objective of the original project was to assess the effectiveness of interventions in facilitating outpatient treatment entry among IDUs (Campbell et al., 2009); the study was not initially designed to examine programmatic differences. Some of the program information used in the present analysis was drawn from a data set collected up to 2 years prior to the collection of the patient and outcome information. Limitations due to the impact of time are mitigated, however, given that the nature of the information collected, (e.g., accreditation), is typically stable. Other limitations include reliance on self-report of treatment entry and loss to follow-up. Although there were no significant differences among sites in follow up assessment rates, overall differences may exist in the rates of outpatient treatment entry between patients who completed all study points and patients with incomplete follow-up data.

Despite the relatively small number of program sites and site self-selection to participate in the study, results may have moderate generalizability within the population of residential detoxification programs that serve IDUs. There was diversity among the sites in geographic locale, patient demographics and drug use characteristics, as well as program size, and services. However, diversity of the overall participant sample was limited with regard to gender (24% women) and race/ethnicity (26% non-Caucasian). Study strengths include the use of Cox proportional hazards regression to account for those with incomplete follow-up data, allowing use of all the available information. In addition, the current study integrated patient and program related data sets, enabling an examination of both types of variables on treatment continuation after detoxification.

There is consistent evidence that continuing care after detoxification results in substantially improved outcomes for injection drug users (Chutuape et al., 2001; Daley et al., 1998; Ghodse et al., 2002; Longshore et al., 1993; Mark et al., 2006). This robust finding has led to investigation of variables that predict transfer to further treatment. Although the majority of studies have focused on individual patient characteristics, the current study suggests the importance of detoxification program-related variables in facilitating continuing care. Developers of program performance measures have begun to address this by including continuity of care after detoxification as an important measure of quality (Garnick et al., 2009). This will encourage the development of programmatic structures, processes and interventions that improve outcomes for patients in detoxification. The present study suggests that smaller detoxification units with longer lengths of stay and treatment services nearby may boost rates of continuing treatment beyond detoxification for IDUs. In addition, innovative research should combine what are typically separate areas of inquiry, for example, matching patients to program variations and examining multilevel interventions that target both patient-level change and programmatic quality improvement.

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Table 1a

Distribution of participants' demographics and other characteristics by site

	Total	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H	p ^d
Total <i>n</i>	632	101	101	70	39	132	62	39	88	
Sex (%)										
Men	75.6	81.2	74.3	98.6	61.5	72.0	69.4	48.7	80.7	<0.001
Race ^b (%)										
White	74.3	86.0	84.2	48.6	82.0	65.1	67.7	61.5	90.7	<0.001
Ethnicity (%)										
Hispanic	9.2	7.9	10.9	21.4	12.8	8.3	3.2	7.7	3.4	0.005
Age (in years)										
Mean	35.9	33.3	33.3	42.1	30.0	38.1	32.0	40.2	37.2	<0.001
SD	9.8	8.1	7.4	7.2	8.6	10.4	10.1	11.1	10.0	
Stage of change (%)										
Preparation	81.5	88.1	81.2	50.0	84.6	87.1	93.6	82.1	80.7	<0.001
Contemplation/ Pre-Contemplation	13.8	10.9	10.9	38.6	12.8	9.9	3.2	15.4	13.6	
Unstaged	4.8	1.0	7.9	11.4	2.6	3.0	3.2	2.6	5.7	
Marital status ^c (%)										
Not married	89.9	91.1	94.1	92.9	82.1	92.4	83.6	89.7	85.2	0.136
Employment status ^d (%)										
Full-time	35.0	43.6	50.5	21.4	46.2	34.1	35.5	15.4	22.7	<0.001
Part-time	26.4	19.8	28.7	44.3	23.1	27.3	22.6	25.6	20.5	
Not employed	38.6	36.6	20.8	34.3	30.8	38.6	41.9	59.0	56.8	
Education (%)										
< 12 years	25.7	35.6	29.7	28.6	25.6	22.0	24.2	7.7	21.8	0.005
12 years	45.6	45.5	49.5	42.9	43.6	47.7	46.8	33.3	46.0	
> 12 years	28.7	18.8	20.8	28.6	30.8	30.3	29.0	59.0	32.2	
Criminal justice involvement ^e (%)										
Yes	46.7	40.6	65.4	38.6	56.4	42.3	41.9	46.2	44.3	0.004
Usual living arrangements ^f (%)										

	Total	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H	<i>p</i> ^d
Stable	81.0	90.1	88.1	42.9	94.9	78.0	95.1	86.8	78.4	<0.001
Chronic medical problems (%)										
Yes	38.5	38.6	35.6	31.4	10.3	41.7	37.1	53.9	48.9	0.001
HIV risk assessment ^g (%)										
Yes	18.7	32.7	23.8	12.9	30.8	9.9	9.7	25.6	12.5	<0.001
Staff recommended treatment (%)										
Yes	56.5	86.1	83.2	44.3	56.4	21.2	59.7	43.6	58.0	<0.001

Note: Percentages may not add to 100 due to rounding.

^a *P*-value obtained from χ^2 test.

^b Not White includes Black, Asian, American Indian/Alaska Native, Pacific Islander, other, and multiple races.

^c Not married includes widowed, separated, divorced, and never married persons.

^d Full-time= 35+ hours per week. Part-time= <35 part-time regular or irregular hours per week. Not employed= student, military service, retired, disability, unemployed or in controlled environment.

^e Yes=on parole or post-release supervision; on probation or pre-sentencing diversion; awaiting charges; or detained in past 30 days.

^f Usual living arrangements refers to the most representative living arrangements in the past three years. Stable living arrangements includes living with sexual partner and children; with sexual partner alone; with children alone; with parents; with family; with friends; alone; controlled environment.

^g Refers to whether patients had an HIV risk assessment while at detoxification unit.

^h Refers to whether patient received a recommendation for treatment from a detoxification unit staff member.

Table 1b

Distribution of participants' recent and past drug and alcohol use by study site

	Total	Site A	Site B	Site C	Site D	Site E	Site F	Site G	Site H	<i>p</i> ^a
Total <i>n</i>										
Number of previous alcohol detoxifications ^b										
None	65.1	76.2	75.3	8.6	66.7	74.2	90.3	65.8	52.9	<0.001
1 to 9	22.4	17.8	17.8	15.7	30.8	24.2	9.7	29.0	37.9	
10+	12.5	5.9	6.9	75.7	2.6	1.5	0.0	5.3	9.2	
Number of previous drug detoxifications ^b										
None	18.9	6.9	8.9	60.0	5.1	5.3	74.2	5.3	4.6	<0.01
1 to 9	62.5	51.5	53.5	14.3	94.9	89.4	25.8	89.5	83.9	
10+	18.6	41.6	37.6	25.7	0.0	5.3	0.0	5.3	11.5	
Days of alcohol use in past 30 days (at baseline) ^b										
None	31.2	36.6	39.6	2.9	35.9	31.8	45.2	30.8	25.0	<0.001
1-10 days	32.4	33.7	32.7	20.0	35.9	32.6	43.6	28.2	33.0	
11-20 days	13.9	12.9	13.9	35.7	10.3	9.1	8.1	12.8	9.1	
21-30 days	22.8	16.8	13.9	41.4	18.0	26.5	3.2	28.2	33.0	
Heroin use in past 30 days (at baseline)										
Yes	80.7	92.9	92.9	50.0	20.5	93.8	87.1	89.7	77.3	<0.001
Stimulant ^c use in past 30 days (at baseline)										
Yes	59.7	47.5	40.6	82.9	97.4	58.3	54.8	52.6	69.0	<0.001
Speedball ^d use in past 30 days (at baseline)										
Yes	37.9	41.8	40.6	39.1	15.4	52.7	40.3	46.2	12.5	<0.001
Frequency of drug injection in past 30 days (at baseline) ^b										
None	2.7	3.0	5.9	2.9	0.0	2.3	1.6	5.1	0.0	<0.001
1-100	53.5	46.0	46.5	82.9	56.4	38.9	46.8	53.9	71.6	
101-200	27.0	32.0	33.7	8.6	20.5	38.2	22.6	18.0	21.6	
201-300	16.8	19.0	13.9	5.7	23.1	20.6	29.0	23.1	6.8	

Note: Percentages may not add to 100 due to rounding.^a *P*-value obtained from χ^2 test.

^b In subsequent analyses, these variables were coded as continuous rather than categorical variables.

^c Stimulant use refers to amphetamine or cocaine use.

^d Speedballs are a combination of heroin and cocaine.

Table 2

Program characteristics of each site

Site	Years in operation	City population ^a	Usual Length			Accreditation in addition to licensure	Miles to Outpatient Program	Number of Services ^b
			Number of beds	of Stay (days)				
Site A	26	92,000	17	5		yes	≤ 1 mile	15
Site B	8	26,000	40	6		yes	≤ 1 mile	3
Site C	24	571,800	100	1.5		no	≤ 1 mile	2
Site D	29	86,487	23	3		yes	> 1 mile	4
Site E	4	575,884	36	4.5		no	> 1 mile	7
Site F	1	72,700	29	8.5		yes	> 1 mile	11
Site G	24	82,111	16	4.5		yes	≤ 1 mile	11
Site H	36	153,700	17	5		no	> 1 mile	12

^aIn multivariate analysis, city population is scaled by 10,000.^bNumber of primary and ancillary services offered by the treatment unit.

Table 3

Percent and proportion of participants entering outpatient treatment within 6 months following detoxification, by site

Site	n	Entered Outpatient Treatment			Lost to Follow-up ^c			
		No.	%	Estimated Proportion ^a	p ^b	No.	%	p ^d
Total	632	179	28.3	0.378	<0.001	210	33.2	0.9147
Site A	101	53	52.5	0.717		31	30.7	
Site B	101	33	32.7	0.429		34	33.7	
Site C	70	4	5.7	0.064		21	30	
Site D	39	6	15.4	0.189		14	35.9	
Site E	132	35	26.5	0.410		46	34.8	
Site F	62	24	38.7	0.488		21	33.9	
Site G	39	14	35.9	0.451		10	25.6	
Site H	88	10	11.4	0.150		33	37.5	

^aEstimated proportion of outpatient treatment entry within six months was estimated by the Kaplan-Meier survival analysis method.^bp-value obtained from log-rank test.^cNumber lost to follow-up indicates the number of patients who were censored prior to the 6-month follow-up visit.^dp-value obtained from χ^2 test.

Table 4

Cox regression multivariate analysis results

Variable	β	SE	χ^2	df	p^a	HR	95% CI
Model 1							
Stage of change ^b							
preparation (reference)	--	--	--	--	--	--	--
contemplation/pre-contemplation	-0.45	0.27	2.80	1	0.09	0.64	0.38
unstaged	-1.10	0.58	3.58	1	0.06	0.33	0.11
Heroin use ^b							
no (reference)	--	--	--	--	--	--	--
Yes	0.43	0.23	3.52	1	0.06	1.53	0.98
Criminal justice involvement ^b							
no (reference)	--	--	--	--	--	--	--
Yes	0.28	0.15	3.37	1	0.07	1.32	0.98
No. previous alcohol detoxifications ^b	-0.02	0.01	3.55	1	0.06	0.99	0.97
Treatment recommendation ^b							
no (reference)	--	--	--	--	--	--	--
yes	0.35	0.16	4.94	1	0.03	1.42	1.04
Model 2							
Criminal justice involvement ^b							
Yes	0.28	0.20	3.46	1	0.06	1.32	0.99
no	--	--	--	--	--	--	--
Usual length of stay ^c	0.28	0.11	11.97	1	<0.01	1.33	1.13
Miles to outpatient facility ^c							
≤ 1 mile	0.88	0.69	9.49	1	<0.01	2.41	1.38
> 1 mile	--	--	--	--	--	--	--
Additional accreditation ^c							
yes	1.15	1.40	6.81	1	<0.01	3.17	1.33
no	--	--	--	--	--	--	--

Variable	β	SE	χ^2	df	p^a	HR	95% CI
Number of beds ^c	-0.03	0.01	21.16	1	<0.01	0.97	0.96 0.98
City population (in 10,000s) ^c	0.04	0.01	19.45	1	<0.01	1.04	1.02 1.06

Note. HR=hazard ratio. CI=confidence interval. Model 2 incorporates a frailty effect for site.

^aP-value obtained from Cox proportional hazards χ^2 test.

^bPatient-level variable.

^cDetoxification program-level variable.