Full length article

Contingency management treatment in cocaine using methadone maintained patients with and without legal problems

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ABSTRACT

Background: Legal difficulties and cocaine use are prevalent in methadone maintenance patients, and they are related to one another, as well as to poor response to methadone treatment. Contingency management (CM) is efficacious for decreasing cocaine use, but the relation of CM treatment to criminal activities has rarely been studied.
Methods: This study evaluated whether baseline legal problems are related to subsequent substance use and illegal activities for cocaine using methadone maintained patients and whether CM differentially improves outcomes depending on baseline legal problems. Using data from four randomized CM trials ($N = 323$), we compared methadone maintained patients with legal problems at the start of study participation to those without initial legal problems.
Results: Overall, the addition of CM to standard methadone care improved substance use outcomes regardless of initial legal problems. Endorsement of legal problems within 30 days of study initiation was associated with reduced proportion of negative samples submitted during the 12-week treatment period. A significant interaction effect of baseline legal problems and treatment condition was present for subsequent self-reports of illegal activities. Those with baseline legal problems who were assigned to CM had reduced self-reports of reengagement in illegal activity throughout a six month follow-up compared to their counterparts randomized to standard care.
Conclusions: Adding CM to methadone treatment improves substance use outcomes and reduces subsequent illegal activity in cocaine-using methadone patients with legal problems.

1. Introduction

Illegal activity and criminal justice system involvement are common in persons with substance use disorders. Methadone maintenance combined with psychosocial support has been widely linked to reductions in illicit opioid use (Mattick et al., 2009) and illegal activity (Gossop et al., 2005; Lind et al., 2005; Oliver et al., 2010; Soyka et al., 2012). Substance use treatment can reduce both drug use and criminal activities (Prendergast et al., 2002), but ongoing legal problems reduce the likelihood individuals remain in treatment (Kelly et al., 2011). As many as 47% of methadone patients continue to engage in illegal acts while receiving methadone maintenance treatment (Bukten et al., 2012). Use of cocaine, history of prior illegal activity, younger age, and male gender all predict continued involvement in crime in methadone-maintained populations (Best et al., 2001; Bukten et al., 2012; Lind et al., 2005; Rothbard et al., 1999). Although many of these risk factors

for continued criminal involvement cannot be modified, targeted treatment of cocaine use may reduce illegal activity in this population.

Co-occurrence of cocaine use disorder is common in methadone maintenance populations, with 40% to 60% having both opioid and cocaine use disorders (Dhingra et al., 2015; Leri et al., 2003; Sees et al., 2000; Wu et al., 2012). Methadone itself has a limited impact on cocaine use (Fischer et al., 2004; See et al., 2000), but contingency management (CM) is an effective treatment for cocaine use disorder (Prendergast et al., 2006), including within methadone maintained populations (Kidorf and Stitzer, 1993; Petry et al., 2005, 2007, 2012, 2015; Petry and Martin, 2002; Peirce et al., 2006; Rawson et al., 2002). CM is a behavioral intervention based on operant conditioning that uses tangible incentives (i.e., vouchers or chances to win prizes) to reinforce specific behaviors, such as submission of cocaine negative samples. Although effective in reducing cocaine use, effects of CM on illegal activity are rarely evaluated (Prendergast et al., 2006).

CM does appear to improve substance abuse treatment outcomes even in patients with legal problems. In cocaine use disorder patients in intensive outpatient treatment, those with any self-reported legal problems had poorer treatment outcomes overall, including shorter periods of retention and briefer abstinence (Petry et al., 2011). Compared to usual care, CM significantly improved abstinence and treatment retention, regardless of legal problems at treatment initiation (Petry et al., 2011). In that study, the effect of CM on reducing illegal activity was not explored, nor was it conducted in methadone patients who have high overall rates of illegal activities.

Given that legal problems create additional barriers to favorable treatment outcomes, the purpose of the current study was to determine whether legal problems at study initiation influence substance use treatment outcomes for methadone maintained patients with cocaine use disorder and whether CM affects this relationship. As the use of cocaine is a predictor of continued crime in methadone patients, this study also evaluated the impact of initial legal problems on post-treatment cocaine abstinence and subsequent engagement in illegal activities. Consistent with the primary findings of the main trials from which these subjects were drawn (Petry et al., 2005, 2007, 2012; Petry and Martin, 2002), we hypothesized that CM would improve cocaine outcomes beyond standard care (SC) regardless of legal problems at the start of the intervention period. We also hypothesized that methadone patients who began the studies with legal problems would continue to engage in higher rates of illegal activities over the next six months than those without initial legal difficulties and that CM may be particularly useful in reducing illegal activities in this subgroup.

2. Material and methods

2.1. Participants

Patients ($n = 323$) were methadone maintained and involved in one of four randomized trials designed to evaluate the efficacy of CM + SC compared to SC alone (Petry et al., 2005, 2007, 2012; Petry and Martin, 2002). All trials had similar inclusion criteria: past year diagnosis of cocaine abuse or dependence per Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision; DSM-IV-TR (American Psychiatric Association, 2000), age ≥ 18, a stable methadone dose for ≥ 1 month, and ability to speak English. Exclusion criteria for all trials were severe cognitive impairment, significant uncontrolled psychopathology, or in recovery from gambling disorder. Recruitment occurred at community-based methadone clinics in New England. All patients provided written informed consent. The University Institutional Review Board approved procedures.

Baseline demographic characteristics are presented in Table 1 for those with ($n = 83$) or without ($n = 240$) initial legal problems. Initial legal problems were classified by scores greater than 0.00 on the Addiction Severity Index (ASI) legal subscale (McLellan et al., 1985), indicating some degree of legal problems such as currently awaiting legal charges, trial, or sentencing, committing illegal activities in the past 30 days, having legal problems they personally felt were at least minor, or desiring a referral for legal concerns.

2.2. Procedures

Patients completed a baseline assessment that consisted of self-report questionnaires, including checklists based on the Structured Clinical Interview for DSM-IV modules (First et al., 1996), and the semi-structured ASI interview (McLellan et al., 1985). Random assignment to a treatment condition followed the baseline assessment. Detailed procedures are included in main study papers (Petry et al., 2005, 2007, 2012; Petry and Martin, 2002), with brief descriptions below.

Table 1
Baseline and Demographic Characteristics by Initial Legal Status.

Variable	No Initial Legal Problems	Initial Legal Problems	Statistical test
n	240	83	–
Treatment condition, *n* (%)			$\chi_1^2 = 0.83$
Contingency management	141(58.8)	44 (53.0)	
Standard care	99 (41.3)	39 (47.0)	
Studies, n (%)			$\chi_3^2 = 1.90$
Petry et al., 2012	96 (40.0)	34 (41.0)	
Petry et al., 2007	56 (23.3)	18 (21.7)	
Petry et al., 2005	60 (25.0)	17 (20.5)	
Petry and Martin, 2002	28 (11.7)	14 (16.9)	
Age	38.9(8.1)	37.9(8.6)	$t(321) = 0.98$
Male gender, n (%)	92 (38.3)	42 (50.6)	$\chi_1^2 = 3.82$
Race, n (%)			$\chi_2^2 = 3.24$
African American	63(26.3)	24(28.9)	
Caucasian	97(40.4)	40(48.2)	
Other	80(33.3)	19(22.9)	
Marital status, *n* (%)			$\chi_2^2 = 1.06$
Never Married	141(58.8)	54(65.1)	
Married	22(9.2)	6(7.2)	
Other	77(32.1)	23(27.7)	
Education, years	11.2(1.8)	11.2(2.3)	$t(321) = 0.02$
Alcohol dependence diagnosis	38(15.8)	15(18.1)	$\chi_1^2 = 0.25$
Cocaine dependence diagnosis	228(95.0)	78(94.0)	$\chi_1^2 = 0.07$
Cocaine positive drug test at study intake, *n* (%)	139(57.9)	48(57.8)	$\chi_1^2 = 0.01$
Methadone dose (mg)	80.83(30.1)	81.83(26.1)	$t(317) = -0.27$
Addiction Severity Index Scores			
Medical	0.29(0.35)	0.31(0.38)	$t(321) = -0.55$
Employment	0.71(0.31)	0.66(0.33)	$t(321) = 1.31$
Alcohol	0.06(0.12)	0.10(0.20)	$t(320) = -2.07^*$
Drug	0.18(0.12)	0.23(0.11)	$t(319) = -3.18^*$
Family/Social	0.12(0.19)	0.19(0.21)	$t(320) = -2.58^*$
Psychiatric	0.23(0.23)	0.27(0.24)	$t(318) = -1.31$
Legal	0.00(0.00)	0.30(0.20)	$t(321) = -23.43^{**}$
Past month days of illegal activities	0.0(0.0)	5.5(9.5)	$t(321) = 9.02^{**}$
Severity of perceived legal problems[a]	0.0(0.0)	1.4(1.5)	$t(321) = 14.59^{**}$
Awaiting charges or sentencing, *n* (%)	0(0.0)	37(44.6)	$\chi_1^2 = 120.83^{**}$
Desire for legal referral[a]	0.0(0.0)	1.2(1.6)	$t(321) = 22.79^{**}$
Lifetime number of arrests	11.6(15.6)	17.2(23.3)	$t(320) = 2.47$
Lifetime number of convictions	5.47(9.2)	7.54 (13.0)	$t(315) = 1.57$
Lifetime arrests with charges			
Drug charges, *n* (%)	153(63.8)	59(71.1)	$X_1^2 = 1.47$
Shoplifting, *n* (%)	102(42.5)	47(56.6)	$X_1^2 = 4.95^*$
Major driving violations, *n* (%)	81(33.9)	41(49.4)	$X_1^2 = 6.30^*$
Burglary, *n* (%)	58(24.2)	35(42.2)	$X_1^2 = 9.75^*$
Assault, *n* (%)	59(24.6)	33(39.8)	$X_1^2 = 6.97^*$
Disorderly conduct, *n* (%)	62(25.8)	23(27.7)	$X_1^2 = 0.11$
Ever incarcerated, *n* (%)	173(72.1)	63(75.9)	$X_1^2 = 0.46$

Note. Values represent means and standard deviations unless otherwise noted. [a] Rated on a 0–4 Likert scale. Significant between group difference.
Initial legal problems were classified by scores greater than 0.00 on the Addiction Severity Index (ASI) legal subscale (McLellan et al., 1985).
* $p < 0.05$.
** $p < 0.001$.

2.3. Treatments

All study patients received SC delivered within a methadone maintenance clinic, involving daily methadone doses, counseling (≥monthly), and random drug testing (≥monthly). Study patients