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## Development of a Multi-Target Contingency Management Intervention for HIV Positive Substance Users

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## ABSTRACT

Contingency management (CM) interventions generally target a single behavior such as attendance or drug use. However, disease outcomes are mediated by complex chains of both healthy and interfering behaviors enacted over extended periods of time. This paper describes a novel multi-target contingency management (CM) program developed for use with HIV positive substance users enrolled in a CTN multi-site study (0049 Project HOPE). Participants were randomly assigned to usual care (referral to health care and SUD treatment) or 6-months strength-based patient navigation interventions with (PN + CM) or without (PN only) the CM program. Primary outcome of the trial was viral load suppression at 12-months post-randomization. Up to \$1160 could be earned over 6 months under escalating schedules of reinforcement. Earnings were divided among eight CM targets; two PN-related (PN visits; paperwork completion; 26% of possible earnings), four health-related (HIV care visits, lab blood draw visits, medication check, viral load suppression; 47% of possible earnings) and two drug-use abatement (treatment entry; submission of drug negative UAs; 27% of earnings). The paper describes rationale for selection of targets, pay amounts and pay schedules. The CM program was compatible with and fully integrated into the PN intervention. The study design will allow comparison of behavioral and health outcomes for participants receiving PN with and without CM; results will inform future multi-target CM development.

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### 1. Introduction

Contingency management (CM) is a financially-based incentive system designed to increase the frequency of desirable behaviors. This is done by offering tangible rewards (reinforcers) in the form of vouchers, prizes, gift cards or cash, based on objective evidence of the occurrence (or non-occurrence) of a particular defined behavior, which is called the target behavior. The CM approach to motivating behavior and behavior change has received consistent support in many contexts. For example, there are numerous examples where tangible incentives have been used successfully to increase rates of

attendance at psychiatric or substance abuse counseling sessions (Corrigan, Bogner, Lamb-Hart, Heinemann, & Moore, 2005; Fitzsimons, Tuten, Borsuk, Lookatch, & Hanks, 2015; Kidorf et al., 2013; Ledgerwood, Alessi, Hanson, Godley, & Petry, 2008; Milward, Lynskey, & Strang, 2014; Petry, Alessi, & Ledgerwood, 2012; Petry, Martin, & Finocche, 2001; Petry, Martin, & Simcic, 2005; Sigmon & Stitzer, 2005; Walker et al., 2010). Another body of literature supports the efficacy of CM interventions for promoting abstinence from drugs of abuse when delivered either in a continuous voucher reinforcement (Lussier, Heil, Mongeon, Badger, & Higgins, 2006) or intermittent reinforcement prize draw systems (Benishek et al., 2014). CM interventions have also been employed and shown to be efficacious for supporting health care related behaviors in difficult populations of substance users. This includes interventions focused on patient return for medical test results (Malotte, Hollingshead, & Rhodes, 1999; Malotte, Rhodes, & Mais, 1998; Thornton, 2008), and for completion of hepatitis B vaccination series (Stitzer, Polk, Bowles, & Kosten, 2010; Topp et al., 2013; Weaver et al., 2014). Incentives have also been shown effective as an intervention to promote medication adherence (DeFulio & Silverman, 2012; Kimmel et al., 2012; Petry, Rash, Byrne, Ashraf, & White, 2012),

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including adherence to anti-retroviral therapy in HIV positive substance users (Javanbakht, Prosser, Grimes, Weinstein, & Farthing, 2006; Rosen et al., 2007; Sorensen et al., 2007).

One hallmark of prior CM intervention in addiction and health care has been the use of single behavioral targets. Focus on a single target is very useful in delineating specific behaviors where CM can be effectively applied to promote behavior change. It is notable, however, that in most therapeutic and behavioral health situations, several of the behaviors that have been targeted individually must be enacted in sequence, and repeatedly over lengthy periods of time, in order to achieve a desired long-term outcome. Thus, patients with a chronic health condition must repeatedly contact a physician, receive and fill medication prescriptions then regularly take those medications in order to achieve desired control over their chronic health condition. Follow-through with sequential health care behaviors is problematic for many groups, but this is especially the case for substance users, whose addiction may interfere with health care adherence at any and all points in the sequence. Well documented in this regard are substance users who are HIV positive. Substance use is associated with poor HIV outcomes including reduced viral suppression and accelerated disease progression (Baum et al., 2009; Lucas, 2011; Milloy et al., 2012; Porter et al., 2003; Weber et al., 2009).

A challenge facing the behavioral health community, then, is to devise and investigate CM interventions that can effectively promote sequences of behavior leading to an ultimate desirable health outcome, a goal that has infrequently been pursued to date (Bassett, Wilson, Taaffe, & Freedberg, 2015). A recently completed multi-site CTN study, project HOPE (CTN 0049, Hospital Visit as Opportunity for Prevention and Engagement for HIV-Infected Drug Users), provided the opportunity to develop a novel contingency management intervention designed to aid in the accomplishment of a long-term health goal, namely viral suppression among HIV positive substance users. The study examined the efficacy of a patient navigation intervention delivered with or without a concurrent fully integrated contingency management incentive program, for its ability to engage HIV positive substance users in HIV care while also encouraging them to address their substance use. The CTN study enrolled 801 HIV positive substance users with detectable viral load, a marker indicating that they were out of compliance with standard viral suppressing HIV regimens. Participants were identified and recruited at bedside in hospital settings where they might have come for any reason but were generally hospitalized for an HIV-related condition. Patients who qualified were enrolled into a 12-month study and randomized to one of three 6-month interventions: usual care referral to outpatient HIV and substance abuse services, patient navigation combined with incentive-based contingency management (PN + CM) or patient navigation (PN) alone. Main outcomes have recently been published (Metsch et al., 2016).

Patient navigation uses a strengths-based case management approach (Gardner et al., 2005) that incorporates motivational interviewing methods (Miller & Rollnick, 2013) in working with participants. The PN approach was selected as the background supporting intervention because it has previously been shown to be efficacious in linking persons newly diagnosed with HIV to primary medical care (Gardner et al., 2005). In the CTN study, navigators helped participants to arrange HIV care and to enter substance use disorder treatment if they desired, to understand their health information, overcome personal barriers to treatment (e.g. transportation and child care) and enlist support from their environment. The CM incentive program was fully integrated into the PN intervention. Since viral load suppression (defined as  $\leq 200$  copies/ml) was specified as the primary outcome in the HOPE study, the ultimate question was whether a multi-target CM program would improve this important down-stream health outcome when used in the context of patient navigation.

The purpose of the present paper is to describe the multi-target contingency management program that was developed for use in the CTN project HOPE, highlighting the principles and considerations that

went into its development. Outcomes examining specific efficacy of the CM intervention components will be available at a later time pending additional secondary data analysis.

## 2. CM parameters and implementation considerations

### 2.1. Incentive earning amounts

The total amount offered in an incentive program is clearly a critical variable. There have been no systematic methods or guidelines developed for selecting pay amounts in CM studies. Conceptually, pay amounts offered must be sufficiently attractive to motivate participants to undertake the desired behaviors. It is also clear from prior research that the higher the magnitude of reinforcement available, the more effective the CM program will generally be (Higgins et al., 2006; Lussier et al., 2006; Petry et al., 2004). Thus, the main constraint on payment in real world settings is the amount that might be supported by local resources and societal opinion, while funding budgets set the constraints in research-supported interventions. One useful precedent for total pay amounts comes from the standard voucher reinforcement program for cocaine abstinence developed by Higgins in which total incentive values in the range of \$1000 were used (Higgins et al., 1994). With this benchmark in mind, payment schedules were developed that would sum to an amount in the range of \$1000–\$1500 over the 6-month study. The final total amount that could be earned was \$1160. It was anticipated that this total amount would be attractive to participants while in fact averaging to only \$193 per month, a very modest sum that may be acceptable to society and health care providers should it prove to be effective.

### 2.2. Incentive earnings distribution

In order to support the main focus of the PN intervention, it was determined that about half the earnings would be allocated to health-related behaviors. As regular contact with the PN was essential for success of the PN intervention, one quarter of earnings was allocated to this goal. The final one-quarter of incentive earnings was allocated to substance use-related goals.

### 2.3. Payment schedules

An important principle incorporated into successful abstinence incentive programs has been the use of escalating schedules of payment such that each successive drug negative sample results in a higher payment than the last, with reset to former lower pay amounts used as a mild penalty in the face of missing or drug positive samples (Higgins et al., 1994). This scheme is designed to engender sustained, rather than sporadic periods of abstinence and has been shown more effective than fixed payment schedules for doing so (Roll & Higgins, 2000; Roll, Higgins, & Badger, 1996). The use of escalating pay schedules was deemed essential for the CTN study as the intervention was in effect over a lengthy 6-month time frame. The escalating schedule is designed to sustain desired behaviors over such lengthy periods of time by providing higher value reinforcement at later time points when frequency of behavior tends to decline and internal motivation may be waning (e.g. Stitzer et al., 2010). While an escalation feature was included for virtually all the target behaviors, resets were used more sparingly and in particular were not included in the incentive plan for appointment keeping behaviors. It was, of course, possible and likely that scheduled appointments would be missed, providing an opportunity for use of the reset feature. However, there was concern that resets for missed appointments might be viewed as punishing and counterproductive by reducing motivation to schedule future appointments. Thus, the goal was to reinforce all attended appointments irrespective of their timing and of scheduling history.

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