Using Contingency Management for the Treatment of Substance Use Disorders in Real-World Settings

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ABSTRACT

- *Objective:* To discuss the efficacy and generalizability of contingency management (CM) for the treatment of substance use disorders and design considerations for those considering implementing in clinical settings.
- *Methods:* Review of the literature.
- *Results:* CM is an efficacious treatment for substance abuse disorders that is widely generalizable across substance use disorders and patient characteristics. CM can be implemented in a number of treatment programs, including residential and outpatient settings, and it can be administered in both individual and group formats. Abstinence and attendance are the most commonly targeted behaviors in substance abuse treatment settings. Design features, including the selection of target behaviors, delivery methods, and reinforcers, are discussed. Schedule parameters, such as frequency, magnitude, immediacy, and escalation of reinforcement, are associated with overall impact of the CM program and are important considerations for those interested in tailoring CM protocols to their needs.
- *Conclusion:* CM is an efficacious option that is applicable to most substance abuse treatment patients. A number of demonstrations of real-world implementation have been published and suggest CM can be adapted with success to clinic settings. In adopting CM protocols, clinics should aim for those protocols with established efficacy; however, if adaptations are necessary, careful consideration should be given to modifications to minimize risks of undermining CM's effects.

Key words: incentives; reinforcement; substance abuse treatment; dissemination; implementation.

Contingency management (CM) is a behavioral intervention that is efficacious in the treatment of substance use disorders (SUDs). CM uses a behavior analytic framework and applies principles of learning theory, particularly operant conditioning theory, to change client behavior(s) [1–5]. In basic terms, operant conditioning principles suggests that whether a behavior continues or not is a function of consequences [6]. Reinforced behaviors are more likely to occur in the future. Substance abuse can be viewed as a behavior maintained by the reinforcing effects of the drug itself [5], including the feel-good aspects of intoxication or relaxation and the amelioration of withdrawal symptoms. CM extends these same principles of to a treatment context, such that reinforcers for abstinent behavior are introduced to compete with the reinforcing effects of continued drug use [5].

In CM's application to substance abuse treatment, drug-negative samples or treatment attendance are reinforced using tangible incentives with the goal of motivating continued abstinence and/or treatment engagement. When clients demonstrate these target behaviors, they earn incentives in the form of goods or services of value to the client, such as small electronics, gift cards, and toiletries. Despite the promising effects observed in research trials, real-world implementation efforts have not kept pace [7–9]. This review briefly discusses CM's efficacy and highlights key features for professionals considering adopting this intervention. Demonstration efforts that illustrate how CM can be effectively implemented within the constraints and limitations of non-research, clinical settings are also presented.

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Efficacy of CM

CM's efficacy spans a number of SUDs, including cocaine, opioids, alcohol, nicotine, and marijuana [10–13], making it amenable for treatment of most SUD clinic populations. It generates larger effect sizes than other SUD treatments, including cognitive behavioral therapy [14], and it has been evaluated in a wide range of settings. Large-scale evaluations have been conducted in both intensive outpatient [15] and methadone maintenance [16] settings as part of the National Institute on Drug Abuse Clinical Trials Network, demonstrating consistent benefits of CM when added to treatment as usual. In the first of these 2 studies, Petry et al [15] randomized 415 stimulant users from 1 of 8 intensive outpatient clinics to treatment as usual or treatment as usual plus CM for alcohol and stimulant abstinence. CM participants submitted more substance-negative urine and breath samples, achieved continuous abstinence at significantly higher rates, and had longer treatment retention compared to those receiving treatment as usual. The parallel study [16] focused on stimulant use in clients from methadone maintenance clinics and found similar benefits of CM on stimulant abstinence. Beyond these settings, CM has been applied in a number of other contexts, including drop-in centers [17], vocational rehabilitation [18,19], job-skills training [20], and residential programs [21–23]. In addition, several group-based adaptations have been explored [17,24–27].

CM benefits most clients and generalizes across several demographic variables, including gender [28,29], race [30], housing status [31], and income levels [32–34]. Among clinical characteristics, CM is efficacious for those with co-occurring SUDs [35], other substance use [36], psychiatric disorders [37–39], medical problems [40–42], and history of transactional sex [43].

Design Considerations

Design features, including what behavior will be reinforced and how to do so, are among the first decision points for clinicians interested in implementing CM. One of the advantages of CM is that it has a high degree of flexibility in design, which means that it can be readily tailored to client populations and clinic needs. However, this flexibility can lead clinicians astray from the foundational principles of CM and unknowingly weaken the impact of the program. Below, some key considerations for CM protocol design are reviewed. For additional coverage of these topics, readers are referred to additional articles [1,2] or Petry's comprehensive book on implementing CM [44]. In this review, published examples of CM's application in real-world settings are presented, highlighting how CM has been adapted in these clinical efforts.

Target Behaviors

The selection of the target behavior will drive many of the subsequent program design decisions. As such, it is important to identify this feature early. Target behaviors must be achievable, objectively verifiable, and well defined. The most common CM targets are drug abstinence or therapy session attendance. CM has also been used to target other behaviors, such as medication adherence [45,46], treatment-related activities [47,48], and exercise [49–51]. Client self-report of behaviors or vaguely defined behaviors (eg, "good participation") should be avoided. While some of the decisions related to CM protocols are flexible, the use of objectively verifiable target behaviors is a core feature that should not be neglected. If the behavior of interest cannot be objectively verified, an alternate behavior should be chosen.

Selection of the target behavior is often considered in hand with defining which population is eligible to participate in the CM program. Client characteristics are often forefront in this decision, but clinic-driven logistical issues or unmet needs may also play a role. A real-world example of this decision process is evident in the nationwide rollout of CM among the intensive outpatient programs within the Veterans Administration (VA). The VA identified a treatment need for those with stimulant use disorders, as this group did not have efficacious pharmacotherapy options available that targeted stimulant use. As such, the VA applied CM to patients with a focus on stimulant abstinence as the behavioral target [52]. For others, the decision may revolve around addressing underutilization of specific treatment resources (eg, outpatient groups, vocational rehabilitation) [53–56] or treatment needs among certain subgroups of clients, such as adolescents [57–59].

For abstinence targets, clinics would need to select one or more specific substances as the focus of the CM program. In general, targeting a single substance rather than multiple substances is more effective [10,13], is more straightforward for clients to understand, and

allows more clients to access the reinforcers. Exposure to the reinforcers is necessary for CM to work; thus, setting a goal that is achievable for most clients should be a priority. Requiring abstinence from multiple substances means that some clients may never experience the reinforcer and thus cannot benefit from its effects at all. Some clinicians or administrators may initially have reservations about reinforcing single drug abstinence in the event that other drug use continues. However, targeting a single substance for reinforcement often results in reduced use of other substances [60]. Clinicians may find that this makes intuitive sense; a client with cocaine use disorder who is trying to maintain cocaine abstinence over a long period is likely to avoid using alcohol or other substances that might lead to relapse. For abstinence, objective verification through urine or breath specimens using tests that include validity checks is relatively straightforward.

Attendance is a popular target for clinics in part because it does not require additional staff time to collect specimen samples and it was the most commonly reported target behavior in samples of SUD providers who use incentives [61,62]. Objective verification of attendance is usually via a staff member, but expectations must be clear to both parties. Clinics should consider potential problems that may arise (eg, arriving late, leaving group early, excused absences) and carefully define and communicate expectations for the CM program. Piloting [19] the CM program with a small group of clients may be valuable in trouble-shooting challenges before wider implementation.

In a recent study [55], clients earned reinforcers for attending clinician-led group counseling sessions and/or the in-clinic patient-led Methadone Anonymous (MA) groups. This non-research, clinical effort addressed historically poor therapy attendance at the clinic, and attendance rates were compared before, during, and after the CM program. CM increased attendance to both groups in the short-term after implementation, but effects were more robust for the MA groups in which increased attendance persisted 3 months following the withdrawal of the contingencies. Overall effects of this program were modest, but they are notable given the use of an ultra-low cost approach.

Delivery Methods

The majority of CM studies used voucher or prize-based methods. Head-to-head comparisons suggest that they are comparable in efficacy [63–65], and each has advantages and disadvantages that may make one option more appealing for a given clinic. Voucher programs are generally straightforward to administer. Clients earn vouchers for each instance of the target behavior. The value of the vouchers typically increases with consecutive performance. The schedule used in the influential Higgins et al studies [66,67] started at $2.50 for the first cocaine-negative sample and increased by $0.50 for each subsequent consecutive cocaine-negative sample. Earned vouchers are exchanged for goods or services selected by the client, increasing the likelihood that the selected items will be highly desirable and allowing for a wide range of client preferences. Clients appear to prefer this approach when given a choice between set schedules or those that introduce an element of chance (ie, prize-based CM, discussed below) [68]. However, voucher programs can be costly (~$1000 per client over 12 weeks) and may require more staff time to fulfill individual requests for specific items. However, staff burden related to shopping can be reduced by limiting these individual requests and using an on-site stocked cabinet of goods similar to prize-CM programs.

Prize-based CM is similar but introduces probabilistic earnings and variability in prize magnitude. Rather than earning vouchers, clients earn draws from a fishbowl for each instance of the target behavior, again typically in an escalating manner. For example, a client may earn one draw from the fishbowl for the first cocaine-negative sample, 2 draws for the second consecutive negative sample, 3 draws for the third, and so on. A typical fishbowl is composed of 500 slips, some noting prizes and some having no prize value. Typically, half the slips in the bowl are non-monetary "good jobs." The remaining half are small prizes worth about $1 in value (eg, food coupons, bus tokens, small toiletries), large prizes worth about $20 in value (eg, small electronics, gift certificates), and one slip is the jumbo prize worth about $100. When a client draws a winning slip, they select a prize from that category (ie, small, large, jumbo) from an onsite, stocked cabinet. Due to the probabilistic feature of prize-based CM, overall costs of the program can be substantially lower than typical voucher programs, with average maximum expected earnings ranging $250 t $450 per client over a 12-week treatment period [15,16,65,69]. Advantages of this method include potentially lower costs and

minimal shopping demands (a once-monthly shopping trip to restock the cabinet will usually suffice) while maintaining comparable efficacy. Relative to voucher programs, prize-based CM involves additional administration time to allow for drawing slips from the fishbowl, which can be compounded when multiple clients want to draw at the same time such as in a group setting. Many of the group-based CM adaptations address this issue by limiting the number of clients who can draw for prizes in a given group or by limiting the number of draws per client [25,27,54].

Reinforcers

Regardless of whether selecting voucher or prize CM, reinforcers are critically important to the success of the program. Reinforcers must be desirable. One of the quickest ways to undermine a CM program is lack of variety or undesirable reinforcers. If stocking a cabinet with prizes onsite, care should be taken to have numerous options within each of the small and large prize categories that are appealing to a wide range of clients. Since a client who is consistently earning draws will choose prizes often, it is imperative to include enough variety so that even these clients find desirable items each time they select a prize. Clients should be asked regularly if they have suggestions for prizes; one program [54] found suggestion boxes useful for encouraging clients to voice their preferences. Donations can be solicited from local businesses to reduce costs [53], and low-cost but high-value options, such as clinic privileges, can also be explored. Petry [1,44] provides some suggestions of the latter, and Amass and Kamien [70] describe their successful strategies to fund and sustain a clinic-based CM program through community donations. Some clinics may already have tangible goods, such as gas or metro cards, that are offered to clients based on need rather than behavior [53]. These existing resources might be redirected to a CM program, in which these goods are contingent on abstinence or attendance, if appropriate.

Schedule Parameters

Once the target behavior, client population, and CM delivery methods are selected, the next step is to design the reinforcement schedule. The following schedule parameters apply to both voucher and prize-based CM systems. The more closely a clinical program adheres to the parameters of effective protocols, the more likely the program is to generate comparable outcomes. If there is a parameter or design feature that is incompatible with clinic needs, modifications can be introduced. However, each deviation away from the ideal has a chance of undermining the success of the CM program. Any changes and their potential impacts should considered carefully, and consultation with a CM expert may aid in the development of successful and efficacious clinic-based protocols. Of note, a meta-analysis [13] of CM studies found that researcher involvement in the planning and design of CM programs is associated with larger treatment effects. CM researchers are especially attuned to the potential impacts and pitfalls associated with modifying CM protocols, and they can be valuable resources for clinics interested in tailoring a CM program to their specific needs. Several examples of clinical demonstration projects that used researcher input are available [19,53,71].

Magnitude

Incentive magnitude was directly related to the size of treatment effects in a meta-analysis [11] of CM studies. Although not all studies find significant differences in outcomes related to magnitude [65,72], the bulk of evidence suggests magnitude is an important parameter and is related to effect size for both voucher [73–75] and prize-based CM [69,76] systems. Thus, although clinics may have restrictive budgets, severely undercutting the magnitude of rewards is not usually the solution as it can undermine treatment effects [76]. Donations can reduce overall costs [53,57,70], and other protocol features discussed below, such as capping the amount of reinforcement available, can reduce the overall magnitude available per patient.

Another approach, used in group-based CM, limits the number of patients who earn prizes per week [25,27]. For example, in a 2011 study by Petry et al, clients added slips with their name to a bowl for attendance and negative samples. Once all names were collected in the bowl, the group leader would pull a specified number of slips (eg, 3 slips per group). These individuals were eligible to draw from the prize bowl for prizes. This approach was associated with longer durations of consecutive abstinence and better treatment attendance relative to treatment as usual. However, clinics can control the overall program costs by limiting the number of patients eligible for prizes.

Frequency

Frequent reinforcement opportunities are ideal, and more frequent assessment is associated with larger treatment effects [10]. However, a number of factors, including which target behavior is selected and logistical issues specific to the clinic such as when groups meet, will play a role in determining the frequency of CM sessions. For abstinence targets, the substance targeted and type of test will largely determine the frequency of CM sessions. The goal would be to test at a frequency that would detect most or nearly all instances of use. For cocaine or opioids, this equates to testing 2 to 3 times weekly. Breath samples for alcohol or cigarette smoking would necessitate testing daily or multiple times per day to detect most instances of use because these tests have short windows of detection. CM protocols based on these breath tests have often had daily or twice daily CM sessions [77,78]; technological adaptations [77,79,80] or residential settings [21,23] may reduce burden to the client for assessment of these substances. Tapering the number of breath tests over time or transitioning from daily breath tests to once or twice weekly urine testing after abstinence is established is another approach [81,82].

Marijuana, on the other hand, poses difficulties because it is detectable in urine samples for up to 2 weeks following use. If relying solely on urine results for reinforcement, clients may not test negative for several days or weeks after last use, resulting in a delay of reinforcement. To address this issue, some CM programs targeting marijuana abstinence initially reinforce attendance in the first 2 weeks and then transition to reinforcing marijuana-negative drug samples for the remainder of the treatment period [48].

In general, more frequent CM sessions can translate to higher costs; however, infrequent reinforcement (ie, less than weekly) is not as effective [45]. In real-world applications, clinics often need to balance feasibility and costs with the ideal CM schedule. In abstinence-based CM, this compromise may result in a testing schedule that may not capture all instances of use. For example, while thrice-weekly testing may be ideal for cocaine or opioids, a twice-weekly schedule may be selected because it lowers costs and is more consistent with clinic schedules.

Immediacy

In general, clinics should aim to deliver reinforcement as immediately as possible, as delays between the target behavior and reinforcement are associated with decreased treatment effects [10,11,83]. For drug abstinence, onsite urine testing systems that provide immediate results are preferred over sending samples for laboratory testing. Clinics that do not have access to or who cannot afford specimen testing that allows onsite collection and immediate results might consider other options for target behaviors, such as attendance.

Immediacy of reinforcement is also important when targeting attendance. One clinic [53] implemented a program that offered a $50 incentive if clients attended 1 month of group therapy sessions. This approach was not effective and no clients earned the incentive for several months. After consultation, the clinic revised the incentive program to a daily drawing for attendance using the fishbowl method, thereby decreasing the delay between the behavior and its consequence. This example illustrates not only problems with delayed reinforcement but also the common mistake of setting expectations for the target behavior too high. Attending a month of group therapy sessions is a high bar that few patients will achieve, resulting in a system that mostly rewards those already doing well [19]. In contrast, attending a single group session in order to earn reinforcers is a reachable goal and increases the likelihood that more clients are exposed to the reinforcers. These small steps (ie, attending a single group or submitting a single drug negative urine) encourage initiation of the behavior(s) targeted. Other features, such as escalation (discussed next), aim to sustain the behavior over time.

Escalation

Escalation involves increasing the amount of reinforcement for each consecutive target behavior. In the voucher programs, the amount earned per negative sample may increase for each consecutive negative sample (eg, $2.50 for the first negative sample, $3.00 for the second, $3.50 for the third, and so on). For prize-based programs, the number of draws escalates with consecutive performance (eg, 1 draw for the first group attended, 2 draws for the second, 3 for the third, and so on). Protocols that include escalation generate larger effects than those that have a set, flat incentive amount even when total costs are the same across comparison conditions [73].

Escalating schedules usually include a reset feature. Following a positive or refused sample or unexcused absence, the amount earned for the next negative

sample is reduced to the initial amount and begins escalating anew with consecutive negative samples. Some schedules allow for a rapid reset in which after a specified period of time or consecutive performance, the value jumps to the value achieved when the relapse occurred [66].

Despite its consistent inclusion in CM protocols from randomized clinical trials, our data [61] suggest that more than half of providers using incentives in treatment as part of a clinical effort do not use escalating reinforcers. Escalating schedules require more careful tracking of client progress, possibly contributing to lower uptake of this design feature in clinical practice. Development of simple tracking forms can minimize this challenge.

Another drawback of escalation pertaining to prize-based CM is that escalating schedules can affect the duration of CM sessions when clients are drawing a large number of slips each session and escalation can increase costs of the overall program. Capping the number of draws will help mitigate both issues. For example, once a client reaches 10 draws for group attendance, they continue earning 10 draws for each consecutive session attended with no further escalation.

Putting It All Together

CM sessions can be conducted as stand-alone sessions or incorporated into group or individual therapy sessions. Many clinicians will find the latter approach sets a positive tone for the therapy session given CM's focus on what the client is doing well. Starting the treatment session with the CM component often naturally leads into a discussion of relevant therapeutic issues, such as effective coping, slips, or triggers. The CM session length can be variable, but it is typically under 10 minutes. Thus, the CM component need not dominate the clinical session or content. CM sessions for abstinence are scheduled according to a set schedule (eg, Mondays and Thursdays) and often coincide with other treatment aspects (eg, before or after group therapy on Mondays and Thursdays). CM sessions for attendance also generally follow a set schedule (eg, client expected to attend Monday and Wednesday group therapy sessions). The duration of the CM protocol can also vary, with most clinical trials ranging from 12 to 24 weeks. Very short durations are unlikely to produce lasting behavior change, particularly with complex behaviors such as abstinence. Petry [44] recommends no less than 8 weeks duration and a maximum duration of 24 weeks.

As discussed, CM offers many opportunities for tailoring to optimize its fit within the existing structure of clinics. However, this flexibility must be viewed together with an understanding of the principles that impact CM's efficacy. Specific recommendations for CM protocol development will depend on the behavior targeted, the delivery methods, and format (eg, individual versus group settings). For these reasons, consultation with a CM expert is ideal. However, some general guidelines for developing a CM program that incorporate the principles discussed above include an 8- to 12-week program that (1) provides sufficient magnitude to compete with the behavior you are attempting to change, (2) offers frequent opportunities for reinforcement (eg, 2-3 times/wk for opioids or stimulant abstinence, 1-2 times/week for attendance targets; not less than weekly for most behaviors), (3) delivers the reinforcement immediately or very close in time with the behavior (eg, reinforce attendance at the beginning of the group, use onsite urine testing and reinforce immediately after testing), and (4) incorporates escalating and reset features into the schedule.

Clinician Training and Supervision

Training in CM is an important part of the implementation process. Studies [62,84–87] have identified a number of perceived barriers to and negative beliefs about CM, including philosophical and logistical concerns. Tangible incentives, the core of most CM protocols, are generally viewed less favorably than social or nonspecified incentives [84,86,87]. Philosophical concerns relate to CM's inability to address the underlying causes of addiction, that it does not address multiple behaviors, and that it may undermine internal motivation for sobriety [62,84]. An additional objection relates to paying someone to do what they should do on their own [86]. Logistical and practical concerns often represent implementation barriers such as costs and access to training and supervision, but they also reflect concern for what happens when contingencies are withdrawn, that clients may sell or trade prizes for drugs, and worries that CM's evidence does not generalize to clinic populations [62].

Many of these beliefs reflect a limited understanding of CM, and addressing these misperceptions is a

first step toward reducing resistance to implementation efforts. For example, a substantial body of literature points to CM's wide generalizability across a range of characteristics, clients that sell or trade prizes for drugs are likely to disrupt their chain of negative samples or attendance, and most studies do not find negative impacts of CM on intrinsic motivation [88–90]. Fortunately, CM training appears to be an effective way to address negative beliefs. In the VA implementation effort [52], training workshops decreased perceived barriers and increased positive impressions of CM [91]. In other training efforts, brief educational materials were effective in changing perceptions of CM's efficacy [92].

Beyond initial training, supervision of CM delivery is likely to be necessary [93,94]. Clinician skill in delivering CM is related to client outcomes [93,95] and relatively simple adherence measures are available for monitoring [96,97]. However, the best methods for training and supervision of CM have yet to be established. The VA initiative was developed in consultation with CM experts and employed ongoing phone consultation following initial training workshops [52,91]. This approach represented significant investment by the VA toward staff training and CM protocol development that may not be achievable for individual clinics. As attention to CM's dissemination and implementation has grown, some free resources have been developed. Promoting Awareness of Motivational Incentives (PAMI; www.bettertxoutcomes.org/bettertxoutcomes/PAMI.html) is a collaborative initiative sponsored by the National Institute of Drug Abuse and the Substance Abuse and Mental Health Services Administration. It offers free resources and training materials.

Conclusion

Overall, CM is a highly efficacious treatment for SUDs that generalizes to most clients. Despite a robust evidence base, CM's implementation in clinical settings lags behind other empirically supported treatments [92]. At least in part, CM's costs, which include not only staff training and adherence monitoring (as with other treatments), but also costs of the incentives themselves, may contribute to slow uptake in clinical settings. Clinics often do not have the resources available for CM within their operating budgets. However, a growing number of projects [19,52,53,55–57,70,71] illustrate CM implementation within routine clinical care, and increased revenue from improved attendance to treatment groups may be one mechanism through which to fund a CM program [54,56,57]. These projects are valuable not only for demonstrating that CM can be efficacious outside the research setting, but also for highlighting how implementation barriers can be overcome. Continued efforts of this nature are likely to be particularly valuable for clinicians and administrators considering adopting CM within clinical settings.

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