

Addiction Messenger

Contingency Management

Part 2: The Founding Principles

"The way positive reinforcement is carried out is more important than the amount."

~B. F. Skinner (1904-1990)

Contingency management is a well-established clinical tool that can help patients stay the path of recovery, one step at a time. Decades of research suggest it can improve patient retention and engagement (associated with better outcomes), increase abstinence, and enhance the experience and environment of substance abuse treatment for both patients and staff. Treatment programs have been able to design many kinds of innovative and creative programs. The key to being successful, however, lies in closely following and adhering to seven core principles.

Per Kellogg et al (2007): "Building on the work of Kazdin (1994), there are seven core issues that all behavior modification programs... will need to address as they are created in terms of altering substance use behavior (Petry, 2000)." Adds psychologist Scott Kellogg (NIDA/SAMHSA-ATTC 2011 [MI:PRESTO on-line training]): "Typically when things go wrong it's because one of these principles in some way hasn't been followed, or it's been violated or poorly administered in some way."

Part 1 of this three-part series provided an introduction to contingency management (which utilizes all types of reinforcement), and motivational incentives (which focuses on positive reinforcement). Part 2 will review the seven core principles underlying effective CM programs, in preface to the final article of the series, which will examine using the principles as a blueprint to design or improve programs.

This issue will continue to highlight and draw from the new Motivational Incentives Suite of resources introduced in Part 1 (NIDA/SAMHSA-ATTC 2011); in particular, the new Promoting Awareness of Motivational Incentives (PAMI) Trainer Guide, and *Contingency management: Foundations and Principles*, a paper written and produced for PAMI (Kellogg et al, 2007).

Seven Core Principles

The seven core principles underlying development and implementation of CM are as follows:

1. Target behavior;
2. Target population;
3. Type of reinforcer (incentive);
4. Magnitude (or amount) of reinforcer;

5. Frequency of reinforcement distribution;
6. Timing of reinforcement distribution; and,
7. Duration reinforcement(s) will be used.

In reviewing the seven principles, this article will focus mainly on motivational incentive (M-Inc) programs. To briefly review, M-Inc programs provide positive reinforcers – such as vouchers, goods, or privileges – to patients for reaching concrete targeted behaviors. M-Inc does not use punishment (to decrease behaviors), or negative reinforcement (an undesirable contingency that is stopped when a target behavior occurs), since positive reinforcement has been shown to be a more effective approach in substance abuse treatment settings (as discussed in Part 1).

1. Target behavior. At face value, choosing a behavior to improve may seem simple – after all, there may be a whole realm of possibilities with patients in early recovery! In reality, this step can be a bit tricky, especially for providers new to using M-Inc. The choice, however, is important. The target behavior is the centerpiece of the behavioral contract, which in turn provides the framework within which incentives can be successfully used (Petry, 2000).

The following are key considerations in choosing a target behavior:

Is the selected behavior a problem for the patient and in need of change? This is fairly obvious, but when implementing positive reinforcement the focus will be on choosing a target behavior to increase or improve.

Is the behavior consistent with the patient's treatment plan? If it is not part of the treatment plan, make sure to include it. It is also helpful for patients to receive reinforcement early in treatment, so they learn the association between behavior and reinforcement.

Can it be clearly described to the patient(s)? Is it specific? The behavior should be specific and observable, so it can be clearly linked to the reinforcement, and so improvement can be measured and effectiveness evaluated.

Can it be observed frequently? Frequent monitoring is important, as behaviors need be reinforced often enough to be effective (see Principle 5, below: *Frequency of reinforcement distribution*).

Is it easy for the patient to earn an incentive, at least initially; i.e., is the target behavior a small enough step towards the goal? A M-Inc "reinforcement" model emphasizes breaking the goal down into very small steps and reinforcing each of the steps as they occur (Kellogg et al, 2005). If the bar is initially set too high for earning an incentive – e.g., achieving abstinence for a month – only those with strong internal motivation, who are least in need of external reinforcement, will earn incentives.

Does the patient consider the target behavior achievable? It's important to include the patient in planning. In several CM studies (i.e. Pierce et al, 2006), a significant number of patients never received a reinforcer because they were unwilling to exhibit the target behavior. This is a significant problem, but can be remedied by lowering the requirements for earning a reinforcement (i.e., altering the target behavior), breaking the behavior into smaller increments/steps, or by increasing the amount of the reinforcement (see Principle 4, below: *Magnitude of reinforcer*).

What type of behaviors will you target? Fortunately, many types of behaviors can be effectively reinforced. Growing evidence suggests it is effective to target behaviors that are incompatible or conflict with drug use. For example, alternative target behaviors could include group attendance (Petry et al, 2005a; Kellog et al, 2005), working on treatment goals (Kirby et al, 1999; Petry et al, 2001), or following up on needed medical care (Elk, 1999; Sorenson et al, 1999).

Research also demonstrates that incentivizing abstinence is effective when treating substance use disorders. As discussed in Part 1, most of the research in the National Institute of Drug Abuse Clinical Trials Network multi-site "MIEDAR" study – the largest study on M-Inc to date – used abstinence as target behavior (Pierce et al, 2006; Petry et al 2005; Roll et al 2006; Stitzer et al, 2010). Targeting abstinence, however, can be challenging; a main reason is that to be effective testing must be done in a manner that provides immediate results, i.e., sending a specimen to a laboratory and giving reinforcements several days later has been shown to be less effective (Kellog et al, 2007; Petry, 2000).

To illustrate why a delay between providing of a drug-negative specimen and delivering the reinforcer might be problematic, consider an example where a male patient is to receive a \$10 fast food voucher if the next urine specimen provided is negative for cocaine. The patient provides a specimen on Thursday, feeling quite proud because the specimen follows six days without cocaine, his personal best for the past three years. On Sunday night, however, the patient uses cocaine. Although he feels bad about the slip, he still receives the \$10 voucher when he attends his next treatment session, meaning the reinforcement is delivered closer in time to the undesirable behavior than the desirable behavior. While he can make the cognitive link between the reinforcement and the targeted behavior he exhibited previously, from a behavior/learning theory perspective this delay dilutes the effectiveness of the incentive program.

2. Choice of target population. While it might be ideal to provide reinforcements for all patients in a program, this may not be feasible, or even necessary. More often choices will be made about where to focus reinforcement-based interventions.

Individuals. M-Inc may be used, for example, with individual patients, such as those who are struggling with abstinence or with taking important steps in their treatment plans.

Sub-populations. Another approach is targeting a group (or sub-population) of patients. Providing reinforcement for methamphetamine abstinence, for example,

might be an important intervention, given the particularly destructive nature of this addiction to patients, families, and communities (Shoptaw et al, 2005). This isn't to minimize the destructive nature of other substances, but shows how resources and outcomes can be maximized by making careful choices about where to target incentives. Another choice might be to use reinforcement interventions with particularly vulnerable populations, such as dually diagnosed patients or pregnant women (Elk, 1999; Shaner et al, 1999).

Agency issues. M-Inc programs can also be designed through a larger agency-wide quality-of-care focus. For example, the goal might be to select a target behavior that would improve retention of patients early in treatment, or attendance in group therapy. Although each individual may participate and benefit, the goals and measures may be stated at an agency level.

3. Choice of reinforcer. Choosing reinforcers carefully is also key to the effectiveness of M-Inc. Clearly, incentives perceived as desirable by the target population are likely to have the greatest impact on behavior change. One way to ensure that incentives are sought-after is surveying patients about what items or privileges they would prefer. Sometimes this differs from what staff perceives as important or good for patients; if choices are made based on staff preferences, however, effectiveness may be compromised. For example, a survey of patients might indicate coupons for fast food are highly desirable, while staff prefer coupons for healthier foods. A smart compromise might be to offer both choices, considering that as patients advance in recovery they may make healthier choices.

Three basic types of reinforcement programs have been used and researched, and reflect a range of reinforcement choices, as follows:

- 1) Contingent access to clinic privileges. Reinforcement in the form of clinic privileges can offer a major advantage in lowering costs. Also, research indicates this approach can help decrease drug use. Maxine Stitzer and colleagues (1993), for example, showed that using take-home privileges in methadone clinics as reinforcement can be very effective. Other possibilities include offering first choice of methadone dosing hours, preferred times for appointments, special parking spots, computer privileges, etc. A variation on this approach is taking goods and services patients already receive on a non-contingent basis, and distributing them contingently. For example, Peter Miller's classic study (1975) showed that making access to social services and employment contingent upon sobriety resulted in significant decreases in alcohol consumption and arrests. More recently, studies have shown positive results using access to work (DeFulio et al, 2009; Silverman et al, 2007, 2005, 2001), and to housing opportunities (Schumacher et al, 2003; Milby et al, 2000), as reinforcers for abstinence.
- 2) On-site prize distribution. The distribution of prizes on-site can be a very powerful motivator. The "Fishbowl Method" developed by Nancy Petry (Petry et al, 2000) is a main example. This approach involves an intermittent rewards schedule, whereby patients who exhibit a target behavior immediately draw a

slip of paper and receive a prize from a selection kept on-site. About half of the prize slips simply offer written praise (e.g. "good job!"), in and of itself a powerful social reinforcer for patients all too familiar with criticism. The other half of the slips offer prize rewards; about half of these are very low cost (e.g. bus tokens and sundries), some are of medium worth, and a few are exciting "jumbo prizes". This cost-saving method was shown to be effective by the CTN's multi-site MIEDAR study (Pierce et al, 2006; Petry et al, 2005; Roll et al 2006; Stitzer et al, 2010), and is the featured approach in the new Motivational Incentives Suite (NIDA/SAMHSA-ATTC, 2011).

- 3) Vouchers or other token economy systems. A third approach involves providing points (e.g., Pickens and Thomason 1984) or vouchers (Higgins et al 1994, 2004; Silverman et al, 1996) contingent upon a target behavior. In these systems the points or vouchers accrue in an "account", which at some point can be "cashed in" for goods, services, or privileges through a process that may involve negotiation with a counselor. Often a variety of "purchasable" options are available, which can help increase the power of these incentives.

"Priming". In cases where a patient hasn't experienced reinforcement, it may be useful to use "priming" to familiarize the patient with experiencing the reinforcer. For example, in a prize draw paradigm, you might give each patient a "free draw" just for being part of the incentive program, "priming" them for positive experience associated with drawing from the fishbowl. Methadone maintenance programs do this naturally by providing take home doses to all patients for Sundays and/or holidays; thus, each patient has been "primed" and has had the positive experience of having a take home dose and not needing to come to the clinic on that day.

Varying reinforcement approaches. Another consideration is that reinforcement desirability may change over time. For example (Kellog et al, 2007): "One clinical program found that, at first, patients were happy getting reinforcements as soon as they had attended a group, but over time they became interested in developing a banking system in which they could build up a balance and cash it in for a higher value reinforcement. It is possible that a program would want to start with a prize system and then switch to a voucher system, or to give patients a choice as to which they would prefer to use as a reinforcement method."

Take a moment to think about what incentives – tangible or intangible – you may already be using, or could use, in your work. Why might these particular reinforcers, or others you might choose, have a motivating effect?

4. Magnitude (or amount) of reinforcer. Interwoven with the discussion of which reinforcer to use is the question of how much of the reinforcer is needed to be effective. Here it's important to keep in mind that the reinforcer (type and magnitude) must successfully compete with reinforcement derived from the behavior targeted for change (e.g., the reinforcing effects of a drug).

The magnitude of reinforcement needed to sustain change may differ for different target behaviors. Also, there may be other significant differences among patients that

contribute to a greater or lesser response to incentive programs. For example, polysubstance users may need greater amounts of reinforcement than patients who use only a single substance. Stitzer et al (1984) felt that such factors to consider could include: (1) the level of past and present drug use; (2) the patient's history of success or failure at stopping the use of drugs; (3) the presence or absence of Antisocial Personality Disorder; (4) the nature and vitality of social networks; and, (5) a patient's historical responsiveness to reinforcements and punishments as motivators for behavior change.

In many successful research studies involving both voucher and prize systems, magnitude was increased relative to consecutive demonstrations of a target behavior. For example, a patient might receive one token (or fishbowl draw) for the first time they attend group, or have a clean drug test; two for exhibiting the target behavior a second time, and so on; if they have a slip (e.g., miss a group or test positive) they would start over with one token or draw.

The key to designing effective M-Inc programs is to identify patient-desired reinforcers that are not associated with high programmatic costs. While many studies have explored the relationships between reinforcement magnitude, outcomes, and associated costs (see Kellog et al, 2007, "*Incentive Magnitude*", for examples) more research is needed in this area.

5. Frequency of reinforcement distribution. Another factor intertwined with the choice and magnitude is the frequency of an incentive's distribution, also known as the "schedule of reinforcement". The schedule is based on many variables: target behavior, resources, the amount of clinical contact with patients, and whether a behavior will be reinforced every time it occurs, or only some of the time.

A M-Inc approach involves reinforcing patients frequently, in order to establish an association between the desired behavior and the reinforcer. This is a reason abstinence (discussed above in Principle 1: *Target behavior*) may not be a good initial choice, if it is not feasible to do drug testing frequently, and also in a manner that allows immediate results (i.e. on-site) per Principle 6, below: *Timing of reinforcement distribution*.

Additionally, schedules can be designed using various approaches. In a "fixed ratio" approach, for example, a ratio of FR1 means that each time a behavior occurs it will be reinforced; FR2 means that two behaviors need to occur before an incentive is provided, and so on. A variable ratio (VR) model refers to an average rate of reinforcement. For example, the Fishbowl Method uses a schedule in which every target behavior is reinforced with a draw from the prize bowl, but on average only every other draw results in a tangible prize item. This method works well in part because the patients receive a secondary reinforcer (the chance to draw slips) every time they exhibit the desired behavior.

In general, it may be useful to begin by reinforcing patients frequently; then, when the behavior change is well established, the frequency of reinforcement can be reduced (Kirby et al., 1999).

6. Timing of reinforcement distribution. The core principle here is that reinforcement needs to follow exhibition of the target behavior as closely as possible. In the Fishbowl Method patients optimally draw for prizes immediately after target behavior occurs. In models using points or vouchers, the actual goods and services are delivered at a later date, but the points or vouchers are delivered when the target behavior is exhibited.

The take home point is that the more immediate the distribution of the incentives, whether material or symbolic, the more effective they will be in shaping behavior. As discussed in Part 1, M-Inc works on a patient's ambivalence – i.e., you are trying to continually tip a patient's decision toward the target behavior. So, in considering what incentive/reinforcer to use, think about how soon it could be delivered immediately following the exhibition of the target behavior. Poor timing can undermine the most well planned intervention – if the patient has to wait for reinforcement following the target behavior, it will diminish results.

7. Duration reinforcement(s) will be used. A final factor relates to the length of the M-Inc intervention, i.e., how long do incentives need to be provided to motivate desirable behavior? Will the duration be decided in advance (fixed duration), or will it be based on patient progress (variable duration)? Also, how will finances impact the incentive program's duration?

Many recent studies have terminated at a fixed duration (about three months on average), regardless of the progress of patients. While the data are mixed (e.g., Higgins et al, 2000), after the removal of incentives patients have at times returned to pre-intervention levels of drug use, or to levels of drug use that were indistinguishable from those of the control group. Paradoxically, relapse under these circumstances may be a sign of a successful intervention (Bigelow et al., 1984; Stitzer et al., 1984). That is, if a treatment is effective, then its removal may lead to a previous behavior.

Silverman et al (1999) make the point that in a clinical setting it would be much better to adapt treatment duration to patient behavior. They suggest that this could be done by gradually increasing the requirements necessary to receive an incentive, while lowering the level of magnitude of the incentive given. Eventually the whole intervention could be phased out (Kirby et al., 1999).

Another possibility, suggest Kellog et al (2007), is to view contingency management as the psychosocial equivalent of methadone, and to propose that treatment duration is indefinite and determined by clinical need. Silverman et al (2004) began addressing this issue in a recent 12-month study with cocaine-dependent patients in methadone treatment. While more research is needed, the study showed sustained positive results, indicating M-Inc interventions may need to be maintained for longer periods of time. Ultimately, of course, patients will need

to internalize the recovery process and find or develop naturally occurring reinforcers that will support recovery (Biernacki, 1986; Kellogg, 1993; Lewis and Petry, 2005).

"The theme that is emerging," write Kellogg et al (2007), "is that incentives are an extremely effective treatment for drug use, and that they should increasingly be considered as a long-term, not a short-term, intervention. While this may appear daunting on the one hand, it actually affirms the fact that there is now a very effective treatment tool available. Future cost-benefit and cost-effectiveness analyses will help to shape clinical and policy decisions about the long-term use of incentive programs."

Conclusion

The seven foundational principles, viewed together, may at first seem complex, but they offer a systematic way to approach implementation. Also, programs new to M-Inc can start small, by designing a simple CM system that is relatively easy to understand and manage. Part 3, the final issue of this series, will focus on issues involved in implementation, including how the new Motivational Incentives Suite (NIDA/SAMHSA-ATTC) can be used to help programs apply the seven principles to design M-Inc programs, or to improve existing approaches.

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