

Contingency Management in a Perinatal Substance Exposure Clinic

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ABSTRACT

Although the overall rate of substance use disorders in the United States has remained stable since 2016, rates of opioid use and stimulant use have continued to increase. Unlike medications for opioid use disorder, there is currently no pharmacological treatment option for stimulant use disorder. Contingency management (CM), a behavioral health intervention based on operant conditioning, is among the few efficacious treatment options for stimulant use. Project CARA, a perinatal substance exposure clinic in western North Carolina, implemented a CM program in 2020. Project CARA's CM program targets appointment attendance, unlike many CM programs that target expected urine drug screen results. Over 14 months, Project CARA's CM program has served more than 160 unduplicated patients. Preliminary data show promise that this program has been effective in maintaining, if not improving, patient appointment attendance despite the challenges of the COVID-19 pandemic and an increase in stimulant use disorders. The authors plan to conduct future research to evaluate the quantitative efficacy of Project CARA's CM program.

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The rate of substance use disorders (SUD) in the United States has remained stable since 2016, but the specific rates of opioid misuse and stimulant misuse have continued to increase.¹ According to a 2019 national survey conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA), 1.6 million individuals 12 years and older had an opioid use disorder (OUD); additionally, 1 million individuals had a methamphetamine use disorder and 558,000 individuals had a prescription stimulant use disorder.¹ Between 2015 and 2016, overdose rates involving stimulants increased by 42%.² This is, in part, related to the intentional and unintentional misuse of fentanyl.³ Recently, unpredictable levels of fentanyl have been detected in stimulants.⁴ Medication for OUD (MOUD) through methadone and buprenorphine pharmacotherapy has proven effective as a treatment for OUD, but there is currently no FDA-approved medication for stimulant use disorders.⁵ Instead, psychosocial interventions such as motivational interviewing, community reinforcement approaches, and contingency management (CM) have been used as treatment options.⁴

Stimulant misuse (StMU), which may or may not meet the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* criteria for a stimulant use disorder but can still negatively affect health, is also increasing during pregnancy.⁶ Like opioid use, StMU during pregnancy is commonly associated with adverse health outcomes such as low birth weight and shorter gestational age.^{6,7} SAMHSA recommends MOUD and psychosocial interventions for pregnant and parenting people with OUD and StMU, respectively.^{8,9}

CM is an efficacious psychosocial intervention for stimulant use disorders. However, CM treatment has not been widely adopted in the United States.¹⁰ In 2020, Project

CARA (Care that Advocates Respect/Resilience/Recovery for All), a perinatal substance exposure clinic, started a CM program for its patients.

Efficacy Across Substances

CM is a behavioral intervention utilizing the principles of operant conditioning.⁴ Participants receive motivational incentives, or positive reinforcement, for targeted behaviors such as attending appointments or reducing substance use.^{11,12} Study results show that reinforcement techniques can increase levels of dopamine, which is especially effective for patients with dopamine deficiencies due to prolonged substance use. Implementation of CM programs is associated with reductions in stimulant cravings, new StMU, and duration of StMU in both the general population and pregnant people.^{4,8}

CM programs have predominantly focused on stimulant use disorders because no approved pharmacologic treatment exists for them. The efficacy of CM programs for cocaine use disorder has been studied since the 1990s.¹⁰ In a meta-analysis of the impact of CM on methamphetamine use disorder, 26 of 27 studies found that CM effectively reduced methamphetamine use and improved treatment engagement and retention.¹³

Despite the research emphasis on stimulant use disorders, the impact of CM programs is not limited to stimulants. Another 2020 meta-analysis of the effectiveness of CM on smoking abstinence showed a significant impact on increased smoking cessation. The meta-analysis also found that CM, when implemented to address tobacco use, correlated with decreased alcohol and illicit substance use.¹⁴ Similarly, a 2020 systematic review evaluated the effectiveness of CM for patients receiving MOUD. It showed that CM interventions decreased StMU, opioid use, and cigarette smoking and increased MOUD adherence and therapy attendance compared with the control intervention across studies.¹⁵

Implementation Models

There are multiple CM implementation strategies. Two models are based on incentives: voucher based and prize based. Voucher-based CM offers vouchers or gift cards as positive reinforcement for the specific targeted outcome. In prize-based CM, patients are offered variably priced and randomized rewards.

Different CM programs target different behaviors. Many programs target expected urine drug screen (UDS) results. Operationally, this means that people with SUD are able to participate in CM only when their UDS does not contain illicit or unexpected substances. Similarly, other CM programs target Breathalyzer test results or therapeutic treatment goals.^{16,17}

Limitations of CM

Despite compelling evidence of CM's efficacy, certain barriers have inhibited widespread implementation. Federal health plans consider CM incentives to be kickbacks (where a medical provider uses compensation to "induce or reward patient referrals or the generation of business involving any item or service payable by the federal health care programs"¹⁸) when their value surpasses a certain amount. Medicare and Medicaid limit the total cost that 1 patient can receive through incentives to less than \$75 annually.^{19,20} In addition to complicating the structure and initiation of a CM program, low monetary maximums are associated with a smaller impact on clinic attendance and medication adherence.²¹

CM for Pregnant/Parenting People

Evidence exists of CM's effectiveness for the perinatal population.²² A 2011 study demonstrated that CM reduced cocaine use in pregnant patients.²³ This study showed that CM was associated with more expected UDS results and a greater duration of abstinence, regardless of which other 2 treatment methods were available to patients in this study (12-step meetings or community reinforcement approach).²³

Currently, CM efficacy data on long-term abstinence and infant outcomes are limited.²⁴ However, CM's demonstrated impact on short-term abstinence and treatment retention is a beneficial strategy during pregnancy, a time when even a limited period of abstinence can lead to positive maternal and infant health outcomes.²⁵

CM at Project CARA

Project CARA is an outpatient, integrated perinatal substance use treatment program located in North Carolina that includes gender-responsive, trauma-informed obstetric care, SUD treatment (including MOUD), behavioral health, and wraparound services for pregnant people through 12 months postpartum. Project CARA was created in 2014 to address the growing number of OUD consults in maternal-fetal medicine, and in response to the increasing rate of StMU and overdose deaths in North Carolina in subsequent years,²⁶ the project introduced a CM program in 2020.

Project CARA serves a largely rural area, which has seen an increase in StMU over the past decade.²⁶ In an analysis of 594 unique Project CARA patients, reported StMU increased from 18.6% to 38.8% between 2014 and 2018.²⁷ Compared with patients without StMU, patients who reported StMU were more likely to have co-occurring mental health diagnoses and/or infectious diseases. Additionally, 65% of patients with StMU had a concurrent diagnosis of an OUD.²⁷ Given the growing prevalence of StMU and comorbidities among

Table. Project CARA's Die Layout^{29,30}

Side of the die	Likelihood of rolling	Approximate value of incentive	Examples of items in this category
"Good job!" sticker	1/6	\$1	Stress ball, baby socks, pacifier
Green sticker	4/6	\$5	Candle, lotion, onesie
Purple sticker	1/6	\$9	Children's book, journal, art supplies

our patient population, we prioritized the implementation of a treatment strategy to ensure that patients were able to have the healthiest pregnancies possible.

Building Project CARA's CM Model

Project CARA is not the first perinatal clinic to implement a CM program. The design was informed by similar programs including one in the Perinatal Addiction Treatment Clinic of Hawaii,²² which, like Project CARA, utilizes a harm reduction model and serves many patients with polysubstance use disorders.

However, CM at Project CARA differs from many other programs in a few ways. First, based on previous studies demonstrating that CM is an efficacious treatment model for people with a variety of substance use disorders, Project CARA offers CM to all pregnant and postpartum patients, not only those patients with StMU.^{10,14,15}

Second, using a harm reduction approach,²⁸ Project CARA chose to reinforce appointment attendance rather than UDS results. This is similar to a CM program implemented at the RAND Drug Policy Research Center, which emphasized patient-centered treatment plans,¹⁶ as well as one at the Perinatal Addiction Treatment Clinic of Hawaii, which emphasized patients' first visits.²² Penalizing an unexpected UDS might increase patient hesitancy around attending appointments or speaking honestly with providers about a return to use or deviation from the treatment plan. Because the perinatal period is a crucial time for patients to engage in care, Project CARA chose to target appointment attendance so we can provide the best care possible and facilitate a safe, supportive environment.

Finally, Project CARA utilized a codesign approach tailored to our patients' needs. The program consulted with a patient focus group, which expressed interest in parent/baby-focused incentives rather than vouchers or gift cards. This focus group offered insight into every decision from the program name to the furniture.

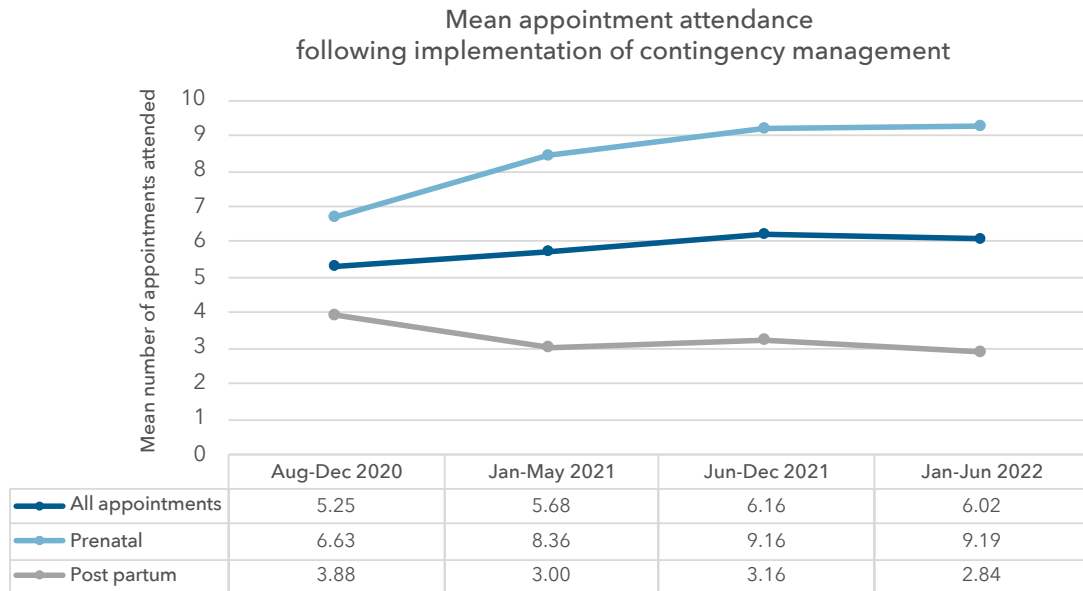
Design and Guidelines

Project CARA's CM program is based in the clinic's "living room," which serves as a comfortable space for patients to wait prior to their appointments; it features armchairs, snacks, water, and a changing table. The living room also contains a large cabinet, the CM Closet, where the program's specialty CM items are located.

Every Project CARA patient can participate in CM at the end of their regular appointment. Project CARA staff walk patients into the living room and open the closet. Patients roll a die to determine the 1 of 3 incentive categories (**Table**) from which they can choose an item.^{29,30} Four of the 6 sides of the die have green stickers, which correspond to an incentive worth \$5. One side is purple, which corresponds to incentives worth \$9. The final side of the die has a "Good job!" sticker; this sticker corresponds to incentives worth \$1. After rolling the die, patients pick an incentive from the corresponding category. Project CARA tracks the monetary value of incentives that each patient accrues annually to follow Medicaid guidelines; once a patient reaches the limit of \$75, they must pause their participation in the program until the following fiscal year.

Preliminary Data

Preliminary data from approximately the first 2 years of this program show an overall upward trend in appointment attendance. Appointment attendance data were collected from 128 patients who delivered between August 2020 and July 2022 and participated in CM. Each patient was categorized by their delivery date, but their appointment dates may have spanned the period before or after. Overall, the mean number of prenatal appointments improved from fewer than 7 appointments in 2020 to more than 9 appointments in early 2022 (**Figure**). The number of postpartum appointments attended remained at approximately 3 visits throughout this period. More data and analysis are needed to understand how these appointment

Figure. Mean Number of Appointments Attended per Patient Following the Implementation of Contingency Management

attendance rates compare with those of patients not engaged in CM, but the preliminary data show promising results in maintaining and potentially improving the number of appointments attended.

Limitations and Challenges

Project CARA was fortunate enough to be able to fund this program through a private grant, which covered the costs of incentives and the closet itself. Although the capital start costs and the first year of operation were covered by this grant, the Project CARA team will need to routinely seek funding for this program moving forward. We acknowledge that seeking ongoing grant funding is not the most sustainable option. Therefore, to promote the efficacy of CM programs, we need to advocate for more reliable funding solutions to enable greater implementation of this evidence-based model.

Another challenge in the implementation of the CM program within Project CARA was designing a tool to ensure compliance with the aforementioned antikickback laws by tracking the incentives received by participants. Project CARA developed a tracking form on a Health Insurance Portability and Accountability Act–compliant online workflow

management software. A similar tracker will be necessary for any CM program limited by patient insurance.

Conclusions

As the rate of StMU increases across the United States, funding and support for treatment options for StMU—including the evidence-based behavioral health intervention of CM—must also expand. Although initially utilized as treatment for people with stimulant use disorders, CM has been a successful intervention for a broader group of people with SUD. Project CARA implemented a CM program for pregnant and postpartum people in the fall of 2020. From August 2020 through June 2022, the program has served 167 unduplicated patients who have visited the CM Closet a total of 678 times. Anecdotally, this program has been effective in improving not only appointment attendance but also staff morale, as it provides a different way for staff to support patients' recovery. Preliminary data found that patients engaged in this program in 2022 attended a mean of 9 prenatal appointments, compared with a mean of 7 prenatal appointments at the program's inception in 2020. This program was able to maintain, if not improve, mean appointment attendance despite the challenges of the

COVID-19 pandemic, an increase in StMU, and a shift from heroin to fentanyl. Project CARA is conducting mixed-methods research to analyze the efficacy of its CM program and assess appointment attendance of patients participating in the program vs those who are not. Additional research will reflect both patient and staff experiences with the CM program.

The effects of Project CARA's contingency management program are aided by its codesign approach, tailored incentives, and intentional choice of targeted behavior. The authors anticipate conducting further research to show the efficacy of this approach and urge others to implement a similar program.

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