Contingency Management for Stimulant Use Disorder: From Evidence to Real-World Implementation

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Conflicts of interest

No conflicts of interest to disclose

Objectives

- At the end of this presentation, participants will be able to:

1. Describe the burden of cocaine use disorder and related mortality
2. Explain the conceptual basis and scientific foundation for contingency management (CM)
3. Describe CM protocols and real-world barriers to implementation
4. Identify CM implementation best practices.

The Washington Post
Democracy Dies in Darkness

Federal government allows program to pay substance abusers for staying clean

March 10, 2022 More than **4 years ago**

SHOTS - HEALTH NEWS

A controversial but effective treatment for meth addiction gains ground

UPDATED OCTOBER 9, 2024 · 6:37 PM ET

FROM TRADEOFFS

By Ryan Levi

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Health

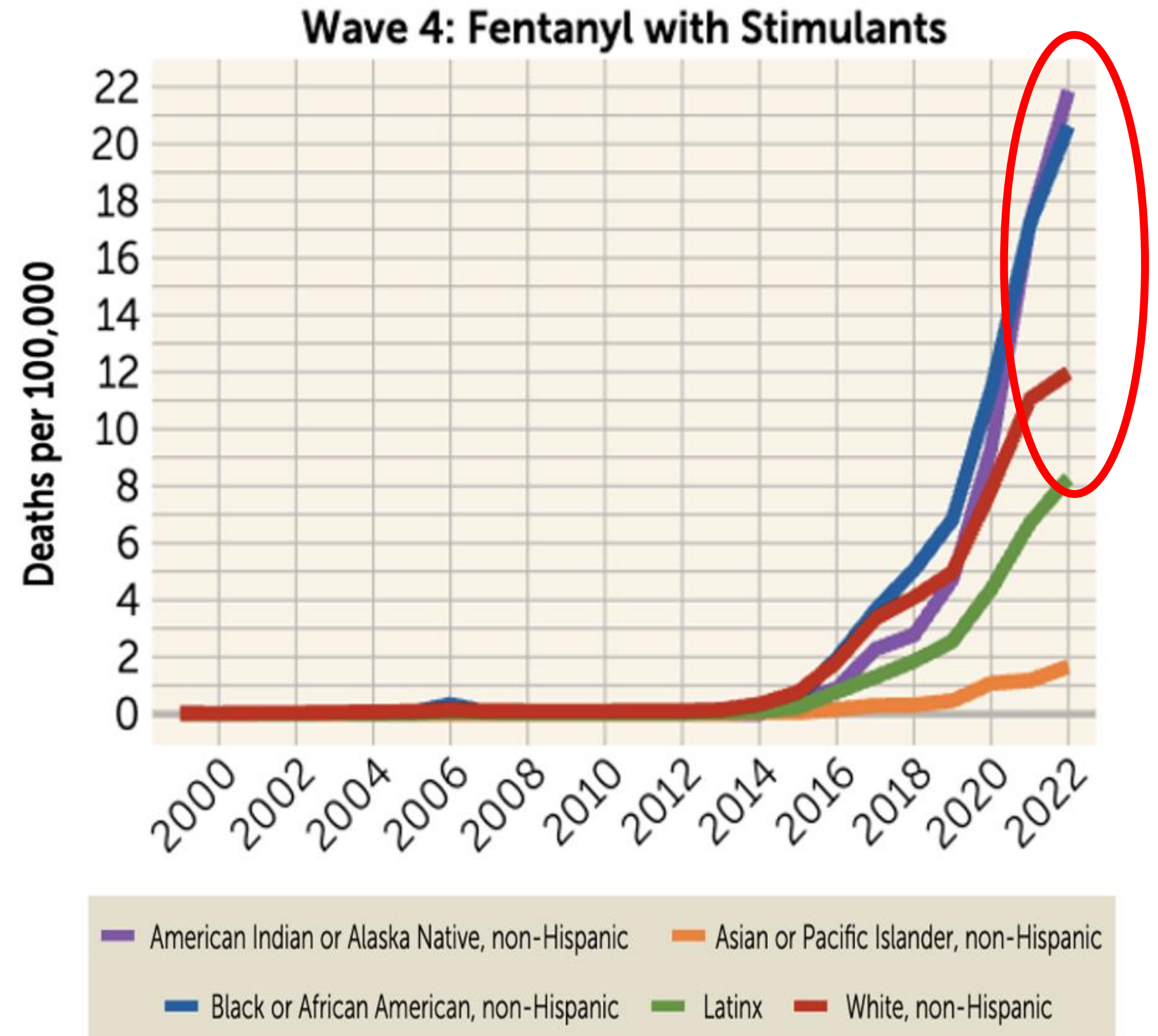
Paid to stay sober; Programs to reward people addicted to drugs for staying clean showing results

By Kenny Choi

Updated on: September 22, 2023 / 5:20 PM PDT / CBS San Francisco

4TH Wave Mortality

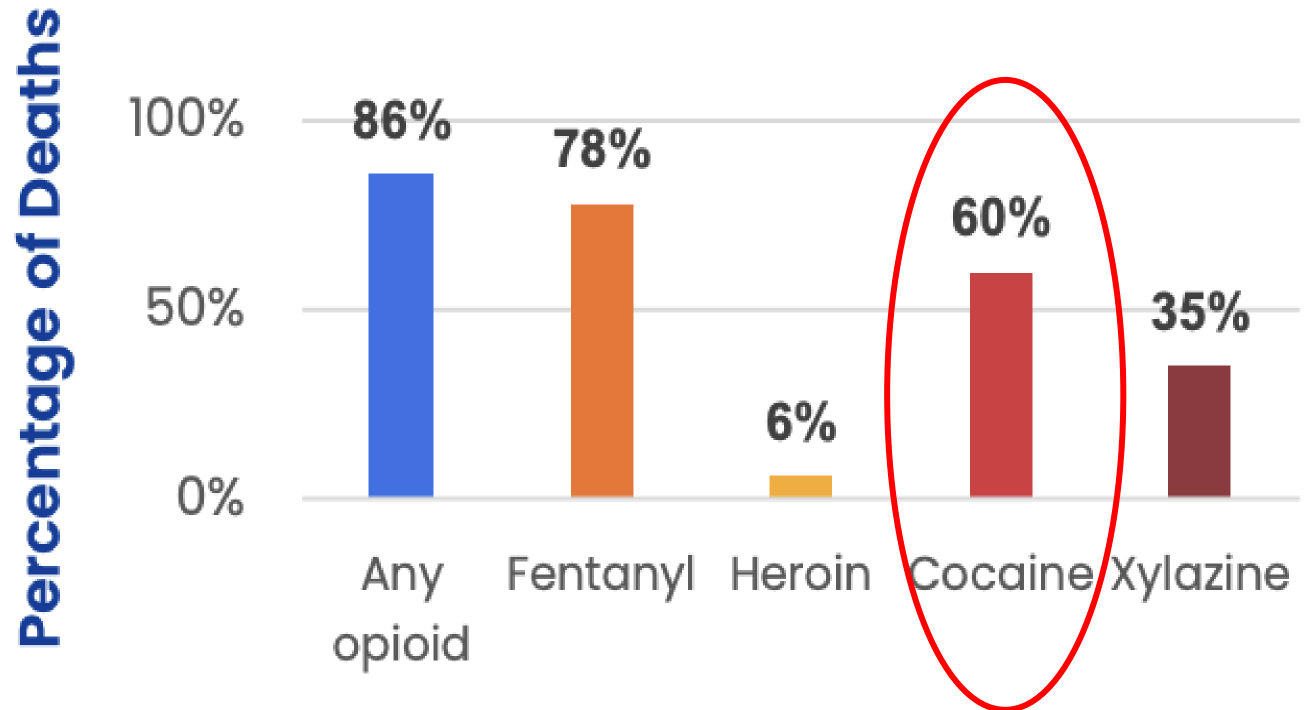
- The 4th wave of the opioid overdose mortality reflects:
    1. Stimulant-fentanyl co-use
    2. Resurgence of stimulant use
    3. Social drivers
- There are no FDA approved pharmacotherapies for stimulant use disorder



Friedman, Tiako, Hansen 2024

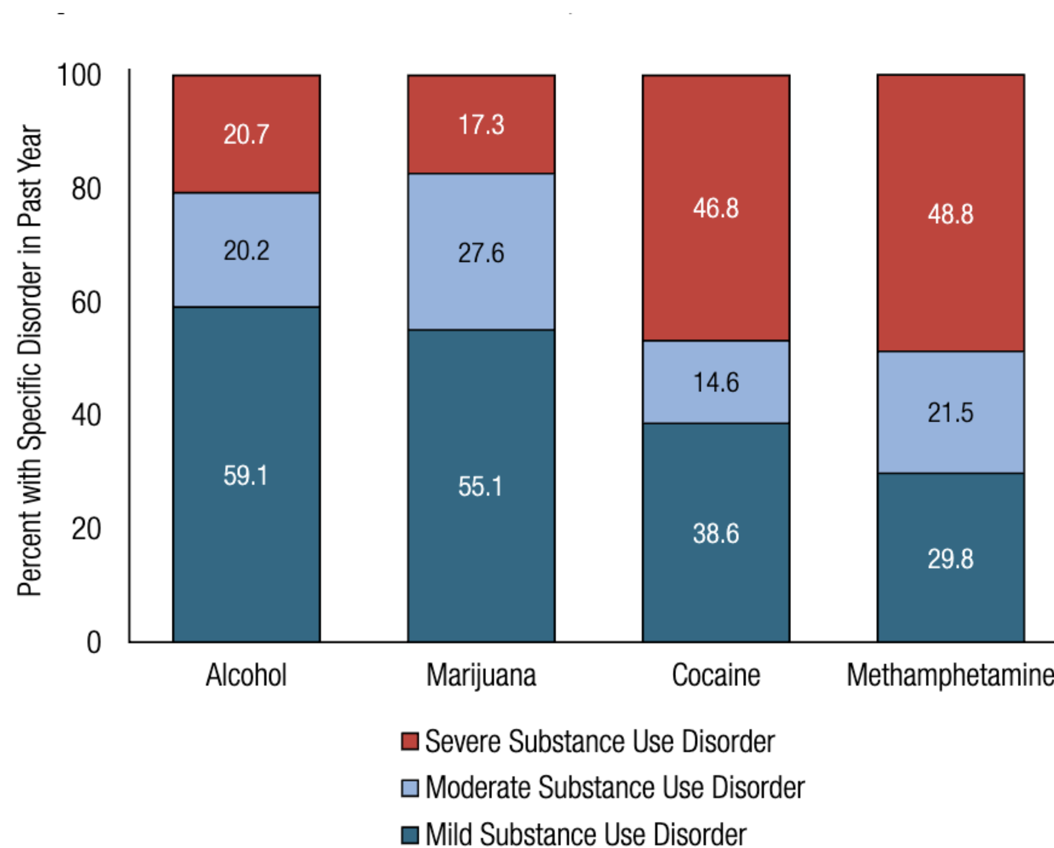
Drug Overdose Deaths in Connecticut

In 2024, 60% of the overdose deaths involved cocaine.



CT.GOV/DPH/INJURYPREVENTION

Almost half of people with stimulant use disorder have severe symptoms



NSDUH, 2022

Meet Tasha

- 32-year-old single African American female
- History of stimulant use disorder, severe and bipolar disorder
- She started using cocaine at the age of 15, currently uses 2-3 bags daily
- Current medications: Paliperidone Palmitate (Invega Sustenna) 156 mg IM q4 weeks, lamotrigine 200 mg daily and topiramate 100 mg PO BID
- Urine toxicology screen today is positive for cocaine and fentanyl.

- Tasha expresses frustration that she has continued cocaine use despite medications and therapy and her unintentional fentanyl exposure.
- After discussing harm reduction strategies, she asks: *“Are there any treatments that actually work?”*
- The clinician introduces CM as an evidence-based intervention.
- The patient agrees to initiate CM.

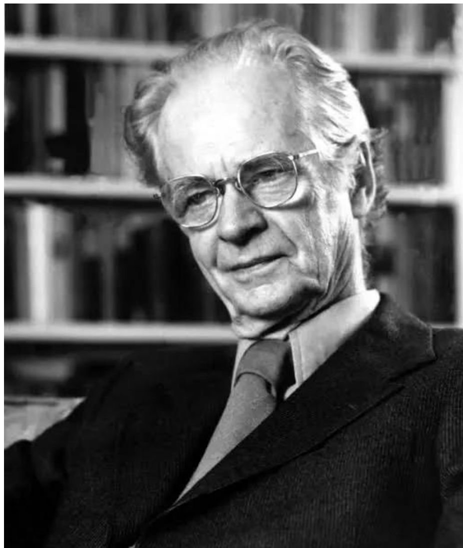
Contingency Management (CM): Background

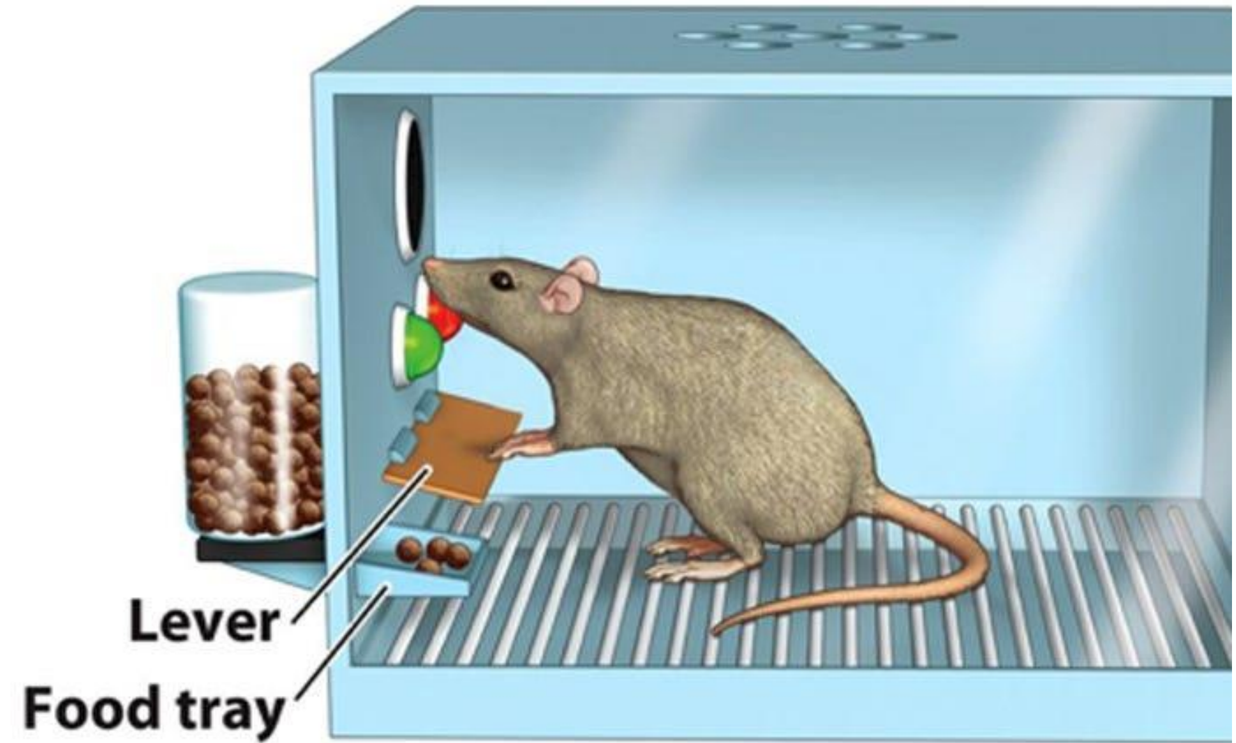
- CM is a behavioral intervention based on operant conditioning using both positive and negative reinforcements
- In CM, **tangible incentives** are delivered in **real-time** when **objectively verifiable target behaviors** are demonstrated with the goal of increasing the probability of behaviors occurring again in the future.

The Goal of CM for stimulant use disorder is not simply abstinence, but the reshaping of the reinforcement landscape

Conceptual Framework: Operant conditioning

Behavior is shaped and maintained by its consequences





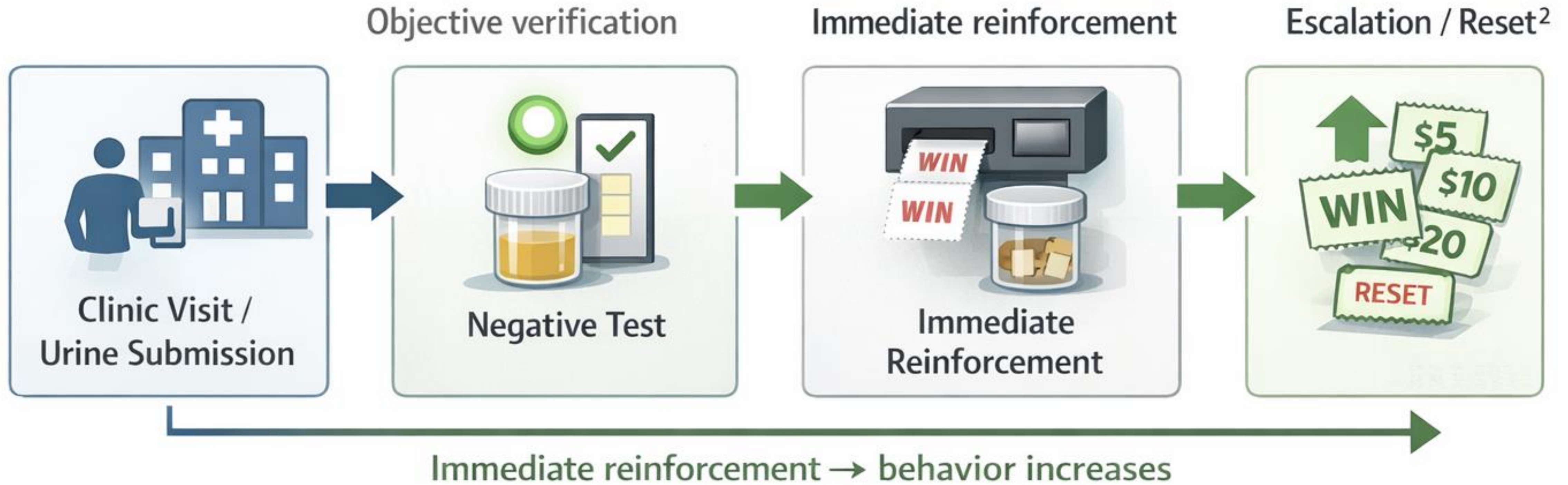
Rationale for CM in cocaine use disorder

- An urgent need for an effective treatment for cocaine against the backdrop of the epidemic of the 1980s
- Laboratory evidence that cocaine use was sensitive to environmental consequences
- When people who use cocaine were allowed a choice between cocaine and earning money, the choice of cocaine decreases in an orderly inverse function to the amount of money offered.

$$C(M) = \frac{C_0}{1 + kM}$$

Applications of CM

- Medication adherence
- Clinic attendance
- Weight management
- Tobacco cessation
- Token economy in inpatient settings



Contingency Management Based on Operant Conditioning

Initial Seminal Clinical Trials

- Higgins, 1991-
  - Results:
  - 85% of those in the VBRT group compared to 33% of the control were retained in treatment
  - Almost half (46%) of the VBRT group achieved ≥ 8 weeks of compete abstinence compared to 0% of control
- Petry, 2000 -
  - Results:
  - Longest duration of abstinence: 4.4 weeks (CM) vs. 2.6 weeks (TAU)
  - 38% (CM) vs. 18% (TAU) achieved ≥4 weeks continuous abstinence
  - 54% (CM) vs. 38% (TAU) cocaine-negative urine samples
  - 7.6 weeks (CM) vs. 5.3 weeks (TAU) retained in treatment retention

Higgins 1992, 1993; Petry et al. (2000)

CM for StUD-Efficacy by Effect Size

Rank	Population / Substance	Outcome	Effect Size	Cohen's d	Interpretation	Source
1	Stimulants (in MOUD populations)	Abstinence (urine-confirmed)	**d = 0.70**	0.70	**Medium–large effect**	De Crescenzo et al. 2021 JAMA Psychiatry CM meta-analysis
2	Cocaine use disorder	Cocaine-negative urine tests	**OR = 2.13**	≈0.42	**Moderate effect**; ~2× likelihood of abstinence	Bentzley et al. 2021 JAMA Network Open cocaine meta-analysis
3	Mixed stimulant / SUD populations	Abstinence across substances	**d = 0.42**	0.42	**Moderate effect** (benchmark CM efficacy)	Lussier et al. 2006 Addiction CM meta-analysis
4	Mixed stimulant populations (post-treatment)	Sustained abstinence (≤1 year)	**OR ≈ 1.22**	≈0.12	**Small but persistent effect** after CM ends	Ginley et al. 2021 long-term CM meta-analysis

De Crescenzo et al. 2021, Bentzley et al. 2021, Lussier et al. 2006, Ginley et al. 2021

Failing to implement contingency management for stimulant use disorder is like refusing to prescribe antihypertensives for hypertension

Contingency Management Systems and Protocols

Voucher-Based Reinforcement Treatment (VBRT)

- Voucher CM:
  - Fixed-value vouchers for each target behavior
- Objective verification → guaranteed reward: no randomness; e.g., $2.50 initially)
- Escalating reinforcement: Each consecutive negative test increases voucher value (e.g., $2.50 → $5 → $7.50 → $10 →) thus reinforcing sustained abstinence.

Higgins et al., 1993, 1994.

Stephen Higgins

Prize based CM (*Petry* Model)

- Developed by Nancy Petry who introduced a probability-based system of rewards with variable prize sizes rather than vouchers (Fishbowl Method)
- Prizes ranged from small ($1) to large prizes ($20) thus introducing the concept of probability (i.e., sometimes you win a prize and sometimes you do not) as well as variability in prize magnitude (small, large, jumbo)
- Overall, less expensive alternative to Voucher CM without sacrificing efficacy

Nancy Petry

Virtual CM:

- Remote verification + immediate rewards:
  Abstinence is confirmed digitally (video, breathalyzer, remote testing) with instant delivery of incentives
- Automated reinforcement structure:
  Platforms apply escalating rewards and reset contingencies based on ongoing behavior
- Scalable, high-frequency care:
  Enables daily monitoring and broader access, removing traditional clinic barriers

Nancy M. Petry et al., 2011

Best Practices

CM is effective regardless of income level, gender, housing status, prior treatment history, comorbid SUD, HIV status or involvement in the criminal justice system.

CM Video

CM Fidelity Anchors: The Achille's Heel

- Clearly defined target behavior
- Objective verification of the target behavior
- Immediacy of reinforcement
- Withholding reinforcement when target behavior is not met
- Appropriate (Frequent) monitoring of target behavior

Jegede, et al, 2026 (under review)

Fishbowl Mechanics

Slip Categories	Quantity of Slips in Fishbowl	Probability	Prize Value
Positive Affirmations (non-winning)	250	.500	$0
Small prize	209	.418	$2
Large prize	40	.080	$20
Jumbo prize	1	.002	$100
	Total: 500 slips		

Rash, 2024

CM dose (Reinforcer Magnitude)

- Higher prize values correlate with improved outcomes; recommend $385-$533 over 12 weeks.
- CM magnitude is important to sustain benefits for patients. Higher magnitude CM increases cocaine abstinence rates
- Studies show higher values reduce dropout rates and increase abstinence.
- SAMHSA imposition of a cap of $75 limit effectiveness; clinics often need extra funds.

Rash, 2022

Frequency and duration

- Thrice-weekly sessions are ideal
- Twice-weekly is acceptable (Mon/Thur. & Tue/Fri)
- **Mon/Wed or Wed/Fri is not CM**
- **Once-weekly monitoring is not CM**
- 12-week minimum recommended for behavioral change.
- **Extended protocols benefit high-risk populations, promoting long-term gains.**

Escalation: Simple Escalation vs Capped

Week	Visit 1	Visit 2	Simple Escalation (No Cap)	Capped Schedule (Max = 8)
1	1	2	1 → 2	1 → 2
2	3	4	3 → 4	3 → 4
3	5	6	5 → 6	5 → 6
4	7	8	7 → 8	7 → **8 (cap reached)**
5	9	10	9 → 10	8 → 8
6	11	12	11 → 12	8 → 8
7	13	14	13 → 14	8 → 8
8	15	16	15 → 16	8 → 8
9	17	18	17 → 18	8 → 8
10	19	20	19 → 20	8 → 8
11	21	22	21 → 22	8 → 8
12	23	24	23 → 24	8 → 8

Simple Escalation	Capped Schedule
300 draws possible (~$791 max value)	**164 draws possible** (~$432 max value)

Reset Mechanisms

- Consistent reset policies ensure fairness and uniformity across patients
- Positive tests reset reward count to reinforce accountability
- Excused absences (e.g., medical emergencies or jury duty) don't trigger resets
- However, unexcused absences (without valid reasons) reset the schedule.

Reinforcer selection and appeal

- Gift cards and practical Items are common choices for prize selection.
- Prizes should be desirable (and culturally appropriate) and appeal to patients to sustain engagement.
- Regular restocking to keeps prizes fresh and maintains interest.

Single vs. Multi-Drug Target CM

- CM more effective when focused on one substance.
- Meta-analysis shows higher effect size for single-target CM.

Comparison of meta-analysis estimates of effect sizes for abstinence outcomes in single drug target CM versus multiple drug target CM protocols.

Meta-analysis	Effect size (*d*) for single drug target CM	Effect size (*d*) for multi-drug target CM
Griffith 2000	Single drug = 1.32	Polydrug = 0.45
Lussier 2006	Cocaine Only = 0.75 Opiates Only = 0.85	Dual Cocaine & Opiate = 0.43 Polydrug = 0.41
Prendergast 2006	Cocaine Only = 0.66 Opiates Only = 0.65	Polydrug = 0.42
Ainscough 2017	Cocaine = 0.75	Dual Cocaine & Opiates = 0.48 Polydrug = 0.62
Bolivar 2021	Stimulants = 0.70	Polydrug = 0.46

Rash, 2022

Tasha: Follow-Up

- Tasha is in clinic today, 4 weeks after completing CM.
- Her urine toxicology was negative.
- Despite ongoing exposure to peers who use cocaine, she reports sustained abstinence due to her improved ability to "understand consequences".

CM Reconditioned Tasha's neurocircuitry

- Addiction causes a disruption of brain's reward & control systems: binge/intoxication, withdrawal/negative affect and preoccupation/anticipation.
- Contingency Management:
  - Competes with drug cues: Builds alternative reward pathways
  - Modulates delay discounting: Makes abstinence immediately rewarding
  - Strengthens cognitive control: Repetition + success → ↑ prefrontal engagement
  - Restores reward signaling: Immediate incentives → ↑ dopamine response to abstinence
  - Rewires learning via operant conditioning

Summary of Best Practices

- All protocols must ensure CM Fidelity Anchors
- Focus on single, clear behaviors for verifiable results.
- Immediate rewards post-behavior provide the strongest reinforcement.
- Escalating reinforcement helps maintain long-term abstinence

Effective treatment for stimulant addiction can be hard to find

SEPTEMBER 15, 2024 · 7:46 AM ET

HEARD ON WEEKEND EDITION SUNDAY

By Martha Bebinger

FROM wbur

The limited adoption of CM in mainstream healthcare delivery despite its recognition as an EBI is perhaps one of the **greatest research-to-practice gaps in all of addiction science**.

Why isn't CM widely implemented?

- Cost concerns
- Policy restrictions (e.g., outdated caps)
- Administrative burden/Staff training gaps
- Workflow disruption
- Stigma

How do we implement CM in our clinic?

- Establish clinic administration support (and secure funding)
- Determine structure (including protocol)
- Establish workflow
- Staffing (CM champion/auditor/clinical supervisor)
- Logistics and supplies (handouts, fishbowl, urine screens, cabinet, prize inventory etc.)
- Monitoring implementation outcomes

Commonly Asked Questions

1. What happens after CM ends?
2. Does CM worsen gambling?
3. Despite requiring abstinence can CM be harm reduction?
4. Is CM cost effective?

Post- CM Treatment Outcomes

- CM effects tend to weaken after reinforcement stops, but significant reductions in substance use after incentives ended
- Longer length of active CM treatment linked to better abstinence up to 1 year later.
- A meta-analysis of 23 randomized trials found that up to 1 year after incentives stopped, people who received CM were more likely to be abstinent than those in comparison treatments (OR 1.22; 95% CI 1.01–1.44)

Ginley, M., Pfund, R., Rash, C., & Zajac, K. (2021)

CM and gambling

- Gambling entails risking an object of value. CM is not about risks. No financial risk to patient
- Previous research have assessed gambling before, during and after participating in CM, no evidence indicates gambling problems develop with CM
- However, expert opinion suggests that patients in recovery from pathological gambling should not be included in prize CM programs.

Petry et al. 2006, NIDA CTN multi-site study. Drug and Alcohol Dependence, 83, 269-273).

CM and Harm reduction

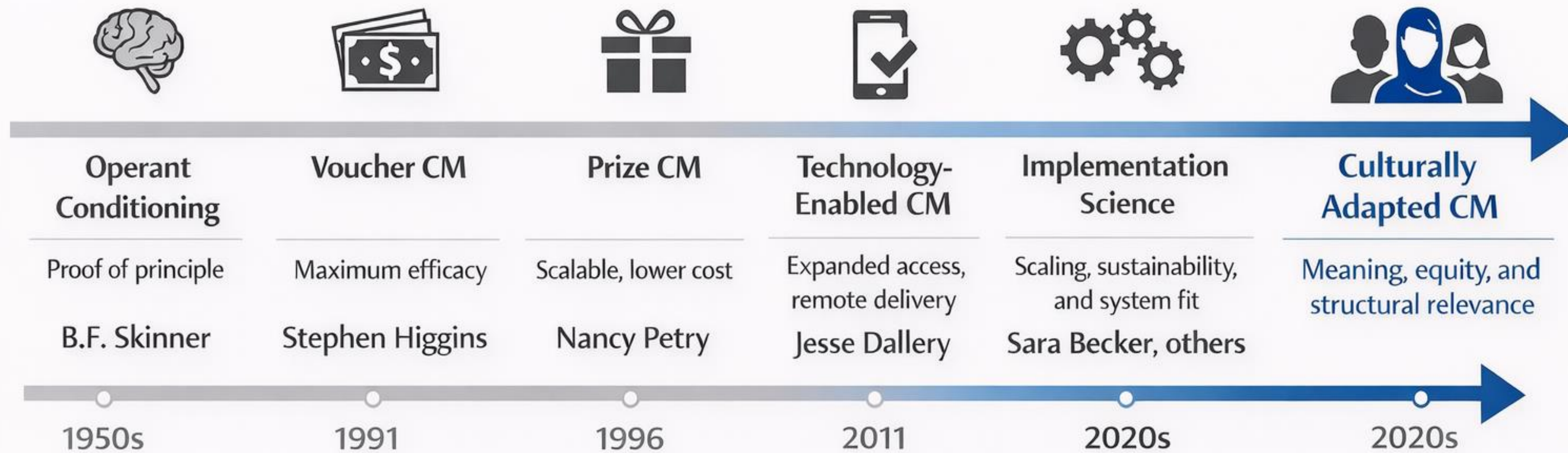
- CM creates real periods of abstinence → immediate risk reduction
  Even short abstinent intervals lower overdose risk and reduce exposure to harms
- Reduces overall use frequency
  More negative tests and longer abstinence streaks → fewer total use days = less cumulative harm
- Improves engagement with care and increased retention-ongoing access to MOUD, naloxone, and medical support
- CM reinforces behaviors that reduce risk- even if abstinence is partial or temporary

Is CM cost effective?

- CM’s cost-effectiveness depends on how “effectiveness” is valued, the incentive structure, setting, and time frame
- Overall, most studies and models show CM can be cost-effective, but economic evidence is limited and context-specific
- Specific to the clinical outcome of time free from stimulants, CM appears to be a “wise investment” for both the provider and the payers.

Murphy et al, 2015; Olmstead & Petry, 2009

The Evolution of Contingency Management—and Its Next Frontier



The question is no longer whether CM works.

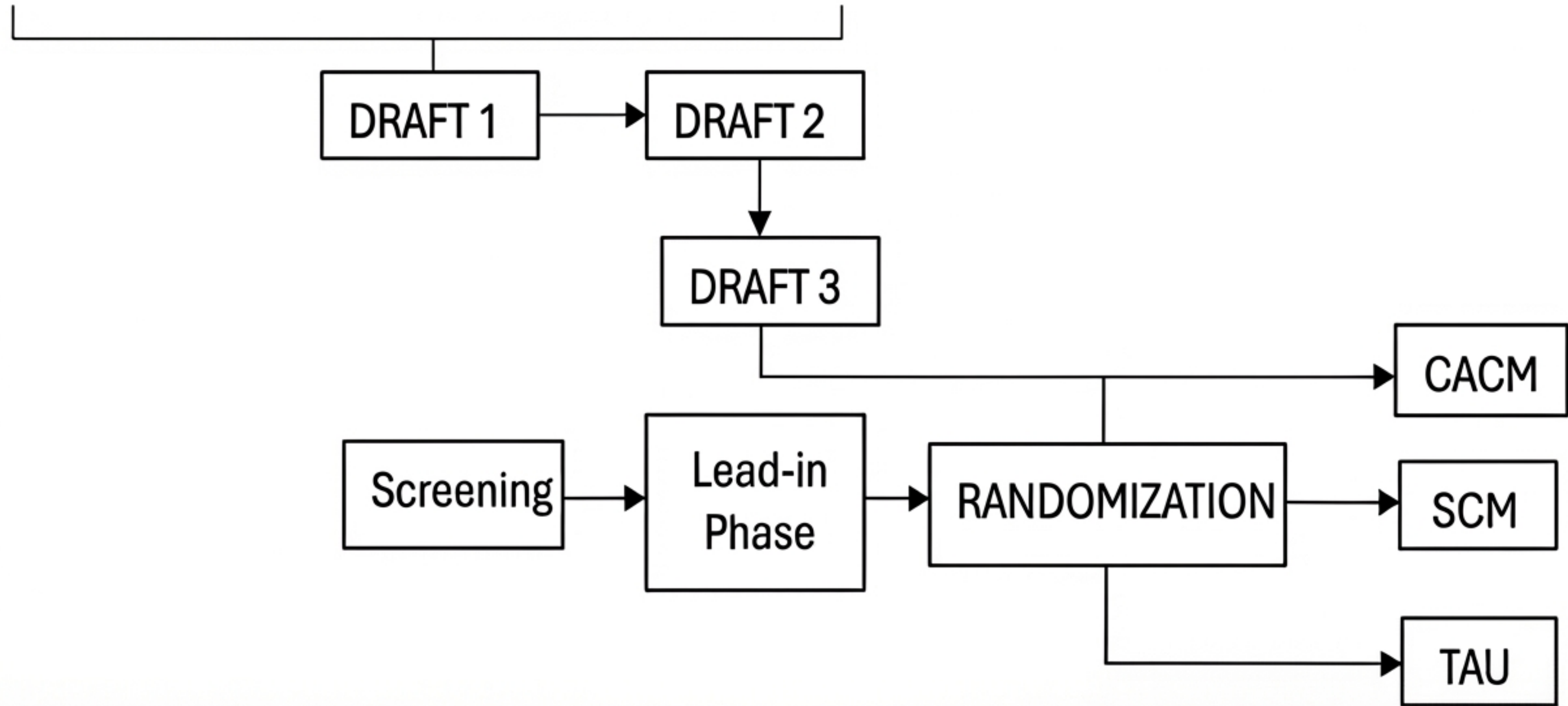
The question is whether it works for the people who need it most.

Culturally Adapted CM

- Adjustments/adaptations may be necessary within acceptable boundaries.
- Input directly from targeted populations and from the clinicians providing their care can be valuable in the design stage.
- CM Fidelity Anchors are non-negotiable components of any CM program.

Cultural adaptation (*Cul-CM Study* Yale IRB 2000040284)

- Cultural adaptation is the systematic modification of context and meaning
- Standard CM underperforms in minoritized populations
- Moves from "one-size-fits-all" → population-responsive care
- The *Cul-CM* study incorporates stakeholder input (people with StUD, family members, community members, and clinicians.



Overview of the ***Cul-CM* Study**, Jegede et al, 2026

Conclusion

- We know how to treat cocaine use disorders!! CM is the most effective intervention
- CM protocols must maintain Fidelity Anchors
- CM implementation is a matter of urgency and equity
- Culturally adapted CM will have a strong public health impact by improving treatment satisfaction, treatment retention, and sustained remission.

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Thank you

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