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Analysis of California Senate Bill 110 Substance Use Disorder Services: Contingency Management Services

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Author

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Analysis of California Senate Bill 110 Substance Use Disorder Services: Contingency Management Services

A Report to the 2021–2022 California State Legislature

April 9, 2021



Key Findings

Analysis of California Senate Bill 110

Substance Use Disorder: Contingency Management Services

Summary to the 2021–2022 California State Legislature, April 9, 2021



SUMMARY¹

The version of California Senate Bill 110 analyzed by CHBRP would as law, regulation, and funding allow, require the Department of Health Care Services (DHCS) to cover contingency management (CM) as an aspect of substance use disorder (SUD) treatment for Medi-Cal beneficiaries.

Benefit Coverage: SUD treatment coverage is standard for Medi-Cal beneficiaries. Federal law and regulation are unclear as to whether Medicaid funds can be used for CM. This analysis assumes Medi-Cal will be able to fund CM. Affecting only the benefit coverage of Medi-Cal beneficiaries, SB 110 would not exceed essential health benefits (EHBs).

Medical Effectiveness: Evidence for SUD treatment with CM varies by SUD. For stimulants (including methamphetamine and cocaine), there is *clear and convincing* evidence that CM can increase during-treatment abstinence, and *limited* evidence that CM can increase posttreatment abstinence (3-6 months). For cannabis use disorders, there is a *preponderance* of evidence that CM can increase during-treatment abstinence, and the evidence is *inconclusive* regarding posttreatment abstinence (3-6 months). For both stimulants and cannabis, there is *clear and convincing* evidence that the effect of CM on increased abstinence does not persist beyond six months.

Cost and Health Impacts²: This analysis models CM for SUDs typically monitored with urinalysis: stimulants and cannabis. Both models increase proportionately: twice the participants would mean twice the costs and outcome impacts. For 1,000 participants, annual cost of stimulant use disorder treatment with CM could cost \$524,000 (without CM, \$345,600) and could result in 13,000 more stimulant-free days as well as participation in 2,400 more group counseling sessions. For cannabis use disorder, treatment with CM could cost \$250,600 (without CM \$172,800) and could result in 7,500 more cannabis-free days.

BILL SUMMARY

As law, regulation, and funding allow, Senate Bill (SB) 110 would allow the Department of Health Care Services (DHCS) to cover contingency management programs as substance use disorder (SUD) treatment for Medi-Cal beneficiaries. SB 110 would specify CM as having an incentive structure, including, but not limited to, scaling rewards for continued evidence of specified behaviors or adherence to treatment goals, that rewards participants for specified behaviors, such as negative urinalysis.

SB 110 would be relevant to the benefit coverage of all Medi-Cal beneficiaries. These beneficiaries can be enrolled in health plans regulated by the Department of Managed Care (DMHC), in County Organized Health System (COHS) managed care programs, or be primarily associated with Medi-Cal's fee-for-service (FFS) program.

As SB 110 specifies urinalysis as a behavior for which participants may be eligible for reward. Therefore, this analysis has focused on stimulant (includes methamphetamine and cocaine) and cannabis use disorder, the SUDs for which urinalysis is a more common component of treatment.

CONTEXT

SUD is a chronic, relapsing disease. CM is a behavioral treatment based on operant conditioning principles that involves providing incentives for meeting specified goals or engaging in target behaviors. CM related to SUD treatment generally involves giving patients tangible rewards such as prizes, cash, or vouchers to reinforce goal behaviors, such as abstinence, medication adherence, or greater/continued engagement with treatment. SUD services such as counseling are already a Medi-Cal covered benefit. CM is often intended as a way to improve the outcomes of these services. CM is not a benefit that directly covers a health care screening, treatment, service, or item. Rather it is an incentive, analogous to, for example, incentive payments for members participating in wellness programs to encourage healthy behaviors. The total cash value a

and other aspects of health make stability of impacts less certain as time goes by.

¹ Refer to CHBRP's full report for full citations and references.

² Similar cost and health impacts could be expected for the following year, though possible changes in medical science

patient could receive through CM ranges widely, with a mean of \$914.46 and a median of \$466 earned.

CHBRP has assumed that CM for SUD treatment programs would be allowed for Medi-Cal beneficiaries (and not be limited to Medicaid's usual \$75 limit on incentives).

Treatment for Substance Use Disorders

Treatments for SUD include residential, inpatient, and outpatient care using behavioral therapy, counseling, and/or prescription medication. Mutual help groups (e.g., Alcoholics Anonymous, Narcotics Anonymous) also support those with SUD to achieve and maintain sobriety. CM can be used as an adjunct to psychosocial treatments (e.g., CBT) for SUD or as a standalone behavioral treatment. Descriptions of treatments for stimulant (including methamphetamine and cocaine) and cannabis use disorder (modeled in two case studies presented in the *Benefit Coverage, Utilization, and Cost* section) follow.

Stimulants are a class of drugs that includes prescription medications to treat ADHD as well as illicit drugs such as cocaine and methamphetamine. Repeated misuse of stimulants can lead to psychological consequences, such as hostility, paranoia, psychosis, as well as physical consequences of high body temperatures, irregular heartbeats, and the potential for cardiovascular failure or seizures. In California, it is estimated that 33% of all admissions to state- and county-contracted SUD programs are for stimulant use disorders – representing nearly 50,000 admissions annually. It is estimated that there are approximately 3,035 deaths from stimulant use disorder in California each year.

Cannabis, also known as marijuana, is the most commonly used psychoactive drug in the United States, after alcohol. Acute effects of cannabis use include nausea, vomiting, and abdominal pain, while chronic impacts include cognitive impairment, pulmonary disease, and sleep disturbance. Chronic use of cannabis has been linked to psychological and physical health consequences, including increased risk for psychiatric disorders (e.g., psychosis, depression, anxiety, and other SUDs), decline in cognitive function, impairment in learning and coordination, reduced educational and

workplace outcomes, and lung inflammation/chronic bronchitis. It is not clear to what extent cannabis use increases the risk of mortality related to these health consequences. It is estimated that 2,782 (7/100,000) Californians are seen in EDs and 543 (1/100,000) are hospitalized for cannabis related issues each year.

For many patients with SUD, attitudinal barriers are the most significant barrier to treatment initiation and persistence. The stigma of SUD and the ability to acknowledge an SUD affect patient desire to seek care, even more so for those who have co-occurring psychiatric conditions. Many people with SUD believe they can solve the problem themselves.

Another barrier for patients participating in treatment specifically using CM is the requirement to travel to the provider's office, sometimes up to two or three times a week. This can cause more of a burden for patients who do not have flexible schedules and those who are living in areas with a shortage of providers administering CM programs. However, when CM is administered as an adjunctive component of psychosocial treatments in the context of intensive outpatient programs (IOPs), patients are already traveling to attend therapy the required two to three times per week.

Medical Effectiveness

There is *clear and convincing*³ evidence that CM is more effective than treatment as usual (TAU) with regard to abstinence during treatment, lower program attrition, and higher treatment adherence. There is *limited*⁴ evidence that CM is effective at improving abstinence rates 3-6 months posttreatment and *clear and convincing* evidence that CM is not effective at improving abstinence maintenance rates beyond six months posttreatment. These results held true for both CM alone and in combination with other psychosocial treatments, such as group counseling. The strength of the evidence for during-treatment and posttreatment effectiveness varies by SUD:

- For cannabis use disorder, there is a *preponderance*⁵ of evidence that CM increases during-treatment abstinence. Evidence is inconclusive regarding increased posttreatment (3-6 months) abstinence.

³ *Clear and convincing* evidence indicates that there are multiple studies of a treatment and that the large majority of studies are of high quality and consistently find that the treatment is either effective or not effective.

⁴ *Limited evidence* indicates that the studies have limited generalizability to the population of interest and/or the studies have a fatal flaw in research design or implementation.

⁵ *Preponderance of evidence* indicates that the majority of the studies reviewed are consistent in their findings that treatment is either effective or not effective.

- For stimulant use disorder (including methamphetamines), there is a *clear and convincing* evidence that CM increases during-treatment abstinence. There is limited evidence that CM increases abstinence 3-6 months posttreatment.

There is clear and convincing evidence that CM is not effective at improving abstinence beyond six months posttreatment for both stimulants and cannabis. There is *limited* evidence that CM is not effective in impacting health care utilization associated with outcomes related to treatment for SUDs.

Since SUD is considered to be a chronic, relapsing disease, treatment effects often do not last beyond the time period in which they are applied. This is true for other behavioral treatments that are considered to be the “gold standard” such as cognitive behavioral therapy (CBT), and for medication assisted therapies (MAT) such as those including methadone and buprenorphine, if the treatment period is not sufficiently long (often one or even many years). Thus, the long-term effects of a typical 12-week CM or CM + CBT program are expected to be limited.

COST AND HEALTH IMPACTS

Currently CM services are not mentioned as a core Medi-Cal benefit. CM programs run by SUD providers may exist in California, but CHBRP is unaware of such services being reimbursed as Medi-Cal covered benefits.

SB 110 does not specify how the DHCS should implement CM for SUD. As the amount of funding that would be available, if any, is unknown, CHBRP has modeled a limited expansion — for only 1,000 beneficiaries in each of two programs — intending to provide two examples that could be expanded, depending on the amount of available funds. The cost of expansion would be roughly linear (twice as many participants would cost twice as much) although some administrative savings may be realized as the number of participants increases.

CHBRP has modeled CM as an addition to outpatient treatment for stimulant (includes methamphetamine and cocaine) and cannabis use disorders, because urinalysis is referenced by SB 110 and because urinalysis is a common aspect of treatment for these two SUDs.

The actual design of CM programs may differ materially from these hypothetical programs, but the selected pair are similar to models in current use and to models that have been evaluated in the scientific literature.

Both hypothetical models combine counseling, a benefit covered by Medi-Cal, with CM. A stand-alone CM program would be expected to have lower expenditures due to lower utilization of counseling services.

Model 1: CM and Stimulant Use Disorder Treatment

The first model is for a 12-week outpatient stimulant (including methamphetamine and cocaine) use disorder treatment program with and without CM. It has the following parameters:

- The CM program can begin at any time during the year, but each beneficiary can only participate in one 12-week CM program per year.
- Duration of the CM program addition to the SUD treatment program lasts 12 weeks for each beneficiary. The model describes total impact, but staggered enrollment could mean a provider offering CM throughout the entire year.
- The SUD treatment program includes group counseling sessions. The maximum number of outpatient counseling sessions a participant could attend during the 12 weeks of CM is 24 (2 sessions per week).
- Urine samples are collected and tested at each group counseling sessions for a maximum of 24 times during the 12 weeks of CM.
- For the first negative urine sample, participants receive a voucher for \$2 (redeemable at program-selected vendors for food, toiletries, and other program-approved items). For each participant, the voucher increases \$2 for each additional consecutive negative urine sample. A positive urine sample would cause the reward to revert back to \$2 for the next negative urine sample.
- The maximum cash value of the CM program per participant is \$600.

Based on published studies, for this model, CHBRP assumes an average of 70% attendance at group counseling sessions with CM compared to an average of 60% attendance at group counseling sessions for the SUD treatment program without CM. CHBRP assumes all participants submit urine samples twice per week. CHBRP estimates 70% of the urine samples are negative for participants with CM compared to 60% for participants without CM.

In addition to the direct costs of the CM (vouchers and administration), the model projects higher attendance for the SUD treatment program with CM services, which generates additional costs for counseling and urinalysis.

Given these parameters and assumptions, CHBRP estimates the following annual costs to offer the 12-week treatment program to 1,000 Medi-Cal beneficiaries with stimulant use disorder:

- \$345,600: SUD treatment without CM
- \$524,000: SUD treatment with CM

There is not sufficient evidence to project applicable cost offsets or savings (such would result from reduced emergency department visits or hospitalizations) for intermittent or continuous abstinence during a 12-week SUD program.

Similarly, as there is not sufficient evidence to project additional posttreatment or long-term abstinence, no long-term offset or savings are projected.

Model 1: Public health impacts

Methamphetamine has taken over as the leading cause of overdose deaths in California (now surpassing opioid overdose deaths).

Although abstinence may not persist posttreatment, achieving periods of abstinence is a goal of treatment. In addition, as there is no FDA-approved medication to treat stimulant use disorder, CM to improve treatment engagement and abstinence may be the best treatment option available.

For every 1,000 Medi-Cal enrollees engaged in stimulant use disorder treatment, adding CM would result in an increase in 4,320 stimulant-free urine samples (13,000 stimulant-free days) and an increase in engagement in treatment for stimulant use disorder by 2,400 group counseling sessions.

Although the quantitative impact of SB 110 on premature death associated with stimulants is unknown, it stands to reason that there could be a reduction in premature deaths due to overdose during periods of abstinence, as well an increase in productivity due to an increased ability to work for those who are abstinent.

Model 2: CM and Cannabis Use Disorder Treatment

The second model is CM added to a cannabis use disorder treatment program with and without CM. It has the following parameters:

- The CM program can begin at any time during the year, but each beneficiary can only participate in one 12-week CM program per year.
- Duration of the CM program addition to the SUD treatment program lasts 12 weeks for each beneficiary. The model describes total impact, but staggered enrollment could mean a provider offering CM throughout the entire year.
- The SUD treatment program includes group counseling sessions. The maximum number of outpatient counseling sessions during the 12 weeks of CM is 12 (1one session per week).
- Due to the longer amount of time cannabis is stored in the body and can therefore be detected in the urine, urine samples are collected and tested once per week for a maximum of 12 times during the 12 weeks of CM.
- CM rewards begin at the third group counseling session as a positive urinalysis test before the third week may be the result of cannabis use prior to the start of the program. During the program, a relapse with a larger amount of cannabis (especially edibles) may be stored in the body for a longer period of time and may therefore cause positive urinalysis in the following weeks, even if the candidate does not continue to use cannabis.
- For the first negative urine sample, participants receive a voucher for \$15 redeemable at program-selected vendors for food, toiletries, and other program-approved items). For each participant the voucher increases \$10 for each consecutive additional negative urinalysis; a positive urinalysis would cause the scaling reward to start at \$15 again upon a negative urinalysis.
- The maximum cash value of the CM program per participant is \$600.

Based on published studies, CHBRP assumes an average of 60% attendance at group counseling sessions with and without CM.

CHBRP assumes all participants submit urine samples at each group counseling session they attend. CHBRP

estimates 45% of the urine samples are negative for participants with CM compared to 30% for participants without CM.

In addition to the direct costs of the CM (vouchers and administration), the model projects greater participation for the SUD treatment program with CM services, which generates additional costs for counseling.

Given these parameters and assumptions, CHBRP estimates the following annual cost to offer the 12-week treatment program to 1,000 Medi-Cal beneficiaries with cannabis use disorder:

- \$172,800: SUD treatment without CM
- \$250,600: SUD treatment with CM

There is not sufficient evidence to project applicable cost offsets or savings (such would result from reduced emergency department visits or hospitalizations) for during treatment or following month's posttreatment abstinence.

Similarly, as there is not sufficient evidence to project additional posttreatment or long-term abstinence, no long-term offset or savings are projected.

Model 2: Public health impacts

In the first year postmandate, CHBRP estimates that for every 1,000 Medi-Cal enrollees engaged in cannabis use disorder treatment, adding CM to this treatment would result in an increase in 1,080 cannabis-free urine samples (7,500 cannabis-free days). It stands to reason, based on the effectiveness of CM for cannabis use disorders, there could be an increase in productivity due to an increased ability to work for those who are abstinent.

Long-Term Impacts

Some interventions in proposed mandates provide immediate measurable impacts (e.g., maternity service coverage or acute care treatments) while other interventions may take years to make a measurable impact (e.g., coverage for tobacco cessation or vaccinations). When possible, CHBRP estimates the long-term effects (beyond 12 months postmandate) to the public's health that would be attributable to the mandate. As there is no research that examines long-term (more than one year) impacts of CM for SUDs treatment on health care utilization, it is not possible to estimate the long-term health and cost impacts of SB 110.

A key barrier to abstinence for any SUD is patient interest and readiness to abstain. CHBRP anticipates the demand for treatment of SUDs would continue as relapsed patients reattempt abstinence and first-time initiators would join the pool of patients seeking care. However, limited patient readiness for SUD treatment and limited number of providers remain significant barriers to care. To the extent that SB 110 results in an increase in SUD treatment with CM, and the extent to which this leads to long-term abstinence, it is possible SB 110 would contribute to reductions in substance use-related morbidity and mortality, such as cardiovascular disease, cancer, HIV, and hepatitis C.

Essential Health Benefits and the Affordable Care Act

Because SB 110 affects only the benefit coverage of Medi-Cal beneficiaries, it would not exceed essential health benefits (EHBs).

A Report to the California State Legislature

Analysis of California Senate Bill 110
Substance Use Disorder Services: Contingency
Management Services

April 9, 2021

California Health Benefits Review Program
MC 3116; Berkeley, CA 94720-3116
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The California Health Benefits Review Program (CHBRP) was established in 2002. As per its authorizing statute, CHBRP provides the California Legislature with independent analysis of the medical, financial, and public health impacts of proposed health insurance benefit-related legislation. The state funds CHBRP through an annual assessment on health plans and insurers in California.

An analytic staff based at the University of California, Berkeley, supports a task force of faculty and research staff from multiple University of California campuses to complete each CHBRP analysis. A strict conflict-of-interest policy ensures that the analyses are undertaken without bias. A certified, independent actuary helps to estimate the financial impact. Content experts with comprehensive subject-matter expertise are consulted to provide essential background and input on the analytic approach for each report.

More detailed information on CHBRP's analysis methodology, authorizing statute, as well as all CHBRP reports and other publications, are available at www.chbrp.org.

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POLICY CONTEXT

The California Senate Committee on Health has requested that the California Health Benefits Review Program (CHBRP)⁶ conduct an evidence-based assessment of SB 110, Contingency Management.

Bill-Specific Analysis of SB 110, Contingency Management

Contingency management (CM) related to substance use disorder (SUD) treatment generally involves giving patients tangible rewards, such as prizes or vouchers, to reinforce positive behaviors, such as abstinence, medication adherence, or greater/continued engagement with treatment. Duration varies widely, but CM is often provided to an enrollee for about 12 weeks.

Bill Language

As possible (below, see discussion of relevant laws and regulations) and as funding allows, SB 110 would require Medi-Cal to cover contingency management programs as SUD treatment, specifying that programs include: an incentive structure, including, but not limited to, scaling rewards for continued evidence of specified behaviors or adherence to treatment goals, that rewards participants for specified behaviors, such as negative urinalysis.

SB 110 would also require the Department of Health Care Services (DHCS) to provide CM guidance and training.

The full text of SB 110 can be found in Appendix A.

Relevant Populations

If enacted, SB 110 would affect the benefit coverage of all Medi-Cal beneficiaries.

Analytic Approach and Key Assumptions

As the bill specifies urinalysis as a potentially specified behavior for which participants may be eligible for rewards, this analysis has focused on stimulant (includes methamphetamine and cocaine) and cannabis use disorder, the SUDs for which urinalysis is a more common component of treatment.

The federal Department of Health and Human Services Office of Inspector General has released an advisory opinion, taking the position that CM at a specific rigorous treatment program did not violate anti-kickback statutes, and the federal Office of Inspector General is currently engaged in rulemaking to evaluate changes to anti-kickback laws, potentially allowing CM. Furthermore, CM has previously been allowed for Medicaid programs. In 2011 the Affordable Care Act (ACA) authorized a Medicaid Incentives for Prevention of Chronic Disease program for smoking cessation in five states, of which California was one, that offered value of more than \$75 to participating beneficiaries. In addition, the Department of Veterans Affairs (VA) offers CM and the National Institute on Drug Abuse at the National Institutes of Health recommends CM for SUD treatment.

Furthermore, CM has previously been allowed for Medicaid programs. In 2011, the Affordable Care Act (ACA) authorized a Medicaid Incentives for Prevention of Chronic Disease program for smoking cessation in CA, CT, NH, NY, and WI (Witman et al., 2018), an effort with offered value of more than \$75 to participating beneficiaries.

⁶ CHBRP's authorizing statute is available at www.chbrp.org/about_chbrp/faqs/index.php.

In addition, the Department of Veterans Affairs (VA) offers CM across its national health care system and has taken the position that CM is an effective treatment and not an inducement (VA, 2020). The National Institute on Drug Abuse at the National Institutes of Health recommends CM for SUDs treatment (NIDA, 2018a).

For this analysis, CHBRP has assumed that CM would be allowed for Medi-Cal beneficiaries.

Interaction With Existing State and Federal Requirements

Health benefit mandates may interact and align with the following state and federal mandates or provisions.

California Policy Landscape

California law and regulations

CHBRP is unaware of a California law or regulation specifically related to CM and Medi-Cal.

Similar requirements in other states

As noted above, in 2011 the Affordable Care Act (ACA) authorized a Medicaid Incentives for Prevention of Chronic Disease program for smoking cessation in CA, CT, NH, NY, and WI (Witman et al., 2018), an effort with offered value of more than \$75 to participating beneficiaries.

Federal Policy Landscape

Affordable Care Act

A number of Affordable Care Act (ACA) provisions have the potential to or do interact with state benefit mandates. Below is an analysis of how SB 110 may interact with requirements of the ACA as presently exist in federal law, including the requirement for certain health insurance to cover essential health benefits (EHBs).^{7,8}

Any changes at the federal level may impact the analysis or implementation of this bill, were it to pass into law. However, CHBRP analyzes bills in the current environment given current law and regulations.

Essential Health Benefits

Nongrandfathered plans and policies sold in the individual and small-group markets are required to meet a minimum standard of benefits as defined by the ACA as essential health benefits (EHBs). In California, EHBs are related to the benefit coverage available in the Kaiser Foundation Health Plan Small Group Health Maintenance Organization (HMO) 30 plan, the state's benchmark plan for federal EHBs.^{9,10}

⁷ The ACA requires nongrandfathered small-group and individual market health insurance — including but not limited to QHPs sold in Covered California — to cover 10 specified categories of EHBs. Policy and issue briefs on EHBs and other ACA impacts are available on the CHBRP website: www.chbrp.org/other_publications/index.php.

⁸ Although many provisions of the ACA have been codified in California law, the ACA was established by the federal government, and therefore, CHBRP generally discusses the ACA as a federal law.

⁹ CCIIO, Information on Essential Health Benefits (EHB) Benchmark Plans. Available at: <https://www.cms.gov/ccio/resources/data-resources/ehb.html>.

¹⁰ H&SC Section 1367.005; IC Section 10112.27.

CHBRP estimates that approximately four million Californians (10%) have insurance coverage subject to EHBs in 2021.¹¹

As the bill would affect only the health insurance of Medi-Cal beneficiaries, SB 110 would not exceed the definition of EHBs in California.

¹¹ CHBRP, *Estimates of Sources of Health Insurance in California in 2021*. Available at: www.chbrp.org/other_publications/index.php.

BACKGROUND ON SUBSTANCE USE DISORDERS AND TREATMENT

SB 110 would, when funding allows, require Medi-Cal to cover contingency management (CM) programs as part of substance use disorder (SUD) treatment. CM is a type of behavioral therapy in which individuals are “reinforced,” or rewarded, for evidence of positive behavioral change such as abstinence from substance use, attendance at treatment sessions, or utilization of medication (Petry, 2011). CM is generally used as a stand-alone treatment or an adjunctive component of a psychosocial/counseling-based SUD or medication assisted therapy (MAT) treatment program. This section provides an overview of SUDs, treatment options including CM, SUD-related mortality rates, and health care services use.

Substance Use Disorder (SUD)

Substance use disorder (SUD) is the clinical diagnosis for substance use that meets criteria per the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), including impaired control, social impairment, risky use, increased tolerance, and withdrawal symptoms (APA, 2013). SUD is a chronic condition, with both environmental and genetic influences (NIDA, 2005). Chronic diseases of all types often involve cycles of relapse and remission, can vary in severity, and often require ongoing professional treatment, lifestyle changes, and case management (ASAM, 2011; Goodwin and Sias, 2014). Similarly, SUDs may go into remission and are characterized by relapses requiring longitudinal, long-term care (Saitz et al., 2008). Patients typically require long-term treatment consisting of multiple episodes of treatment over several years (Dennis and Scott, 2007). It is estimated that of those who are able to achieve long-term abstinence, only half are able to achieve it on the first try (McQuaid et al., 2017). Overall, successful SUD recovery typically requires an average of 2-5 recovery attempts (Kelly et al., 2019). Many other patients are never able to achieve long-term recovery. Therefore, treatment goals not only focus on abstinence, but also on reducing harm from the negative consequences of substance abuse. SUDs result in significant mortality in California, with an estimated 17,000 deaths due to alcohol and illicit substances each year (CDC, 2013; CDPH, 2019b).

There are a number of licit and illicit substances that qualify for an SUD diagnosis including opioids (heroin and misuse of prescription pain medications such as fentanyl and oxycodone), alcohol, cannabis, nicotine, inhalants, hallucinogens, stimulants (amphetamine, methamphetamine, cocaine), and sedatives. Five of these substances are most often the subject of SUD CM programs (opioids, stimulants, marijuana [cannabis], alcohol, and tobacco) (Davis et al., 2016; Prendergast et al., 2006). SUD treatment using CM requires detection of the target substance’s metabolites to confirm abstinence. As discussed in the section below on detection, it is estimated that urinalysis is most suitable for use in treating SUDs that do not utilize medication assisted therapy.

While 8.8% of Californians 12 years or older report having a substance use disorder¹² in the past year, based on the requirement in SB 110 that CM programs utilize **urine-based screening** to detect substance use, CHBRP estimates that SB 110 would primarily apply to **stimulant use disorder** and **cannabis use disorder**. It is estimated that 3.6% of Californians have one of these two SUDs (SAMHSA, 2020b).

The version of SB 110 analyzed for this CHBRP report would primarily apply to treatment of SUDs related to stimulant use disorder and cannabis use disorder. These two disorders are described in more detail below. The amended version of SB 110 would apply to a wider range of SUDs. As we did not have time to conduct a complete analysis of the impact of the amended version of SB 110, limited information on opioid use disorder, alcohol use disorder, and tobacco use disorder can be found in Appendix D.

¹² Substance use disorder as defined by SAMHSA includes illicit drug and alcohol dependence, which is inclusive of cannabis use which is illegal at the federal level and excludes tobacco use disorder.

Stimulant Use Disorder

Stimulants are a class of drugs that includes prescription medications to treat ADHD as well as drugs such as cocaine and methamphetamine. Repeated misuse of stimulants can lead to psychological consequences, such as hostility, paranoia, psychosis, as well as physical consequences of high body temperatures, irregular heartbeats, and the potential for cardiovascular failure or seizures (NIDA, 2018b).

The DSM-5 characterizes stimulant use disorder as a pattern of stimulant use (e.g., methamphetamine, cocaine) that results in significant impairment or distress. People meeting at least two of 11 specified criteria within a 12-month period are diagnosed with mild, moderate, or severe substance use disorder depending on the number of criteria met (APA, 2013). Stimulant use disorder prevalence in the United States is relatively low compared with other substances, with 0.2% of the population reporting a prescription stimulant use disorder, 0.4% of the population reporting a methamphetamine use disorder, and 0.4% of the population reporting a cocaine use disorder (SAMHSA, 2019a). In California, it is estimated that 33% of all admissions to state- and county-contracted SUD programs are for stimulant use disorders – representing nearly 50,000 admissions annually (CHCF, 2018).

The pattern seen in California and other western states, where stimulants such as methamphetamine are the leading cause of overdose deaths, is significantly different from the pattern seen in eastern states, where opioids such as fentanyl are the leading cause of overdose deaths (Hedegaard et al., 2019). For example, in Region 9 (California, Arizona, and Nevada), the leading cause of death from overdose was methamphetamine (5.2 per 100,000), followed by heroin (2.2 per 100,000), fentanyl (1.5 per 100,000), and cocaine (1.3 per 100,000) (Hedegaard et al., 2019). Across the United States the leading cause of overdose death is fentanyl (8.7 per 100,000), followed by heroin (5.0 per 100,000), cocaine (4.6 per 100,000), and methamphetamine (2.9 per 100,000) (Hedegaard et al., 2019). In 2018, 1,954 (5/100,000) Californians were seen in EDs for amphetamine overdose and 536 (1/100,000) Californians were seen in EDs for cocaine overdose (CDPH, 2019b). The rise in methamphetamine use in California is particularly concerning due to the increased use of fentanyl in methamphetamine and, as a result, an increase in fentanyl-related overdoses. An estimated 3,035 deaths are from stimulant use disorder in California each year (CDPH, 2019b).

There are disparities in rates of stimulant use and stimulant use disorder by gender and sexual orientation. Women tend to start using stimulants at a younger age and are more sensitive to the effects of cocaine and methamphetamine, and can become more dependent on methamphetamine than men (NIDA, 2020). Sexual orientation is also a predictor, with gay, lesbian, and bisexual men and women having higher odds of stimulant use as their heterosexual counterparts (Philbin et al., 2020).

Cannabis Use Disorder

Cannabis, also known as marijuana, is the most commonly used psychoactive drug in the United States, after alcohol (NIDA, 2019). Acute effects of cannabis use include nausea, vomiting, and abdominal pain, while chronic impacts include cognitive impairment, pulmonary disease, and sleep disturbance. Chronic use of cannabis has been linked to psychological and physical health consequences, including increased risk for psychiatric disorders (e.g., psychosis, depression, anxiety, and other SUDs), decline in cognitive function, impairment in learning and coordination, reduced educational and workplace outcomes, and lung inflammation/chronic bronchitis (NIDA, 2019). It is not clear to what extent cannabis use increases the risk of mortality related to these health consequences (National Academies of Science, Engineering, and Medicine; 2017). It is estimated that 2,782 (7/100,000) Californians are seen in EDs and 543 (1/100,000) are hospitalized for cannabis related issues each year (CDPH, 2019b).

Although 19.4% of Californians 12 years and older report cannabis use in the past month, only 2.1% report having cannabis use disorder (SAMHSA, 2020c). Research suggests that 9% of adults who use cannabis will become dependent, and that this increases to 17% in individuals who initiate cannabis use during youth (NIDA, 2019). In California, it is estimated that 15% of all admissions to state- and county-contracted SUD programs are for cannabis use disorders – representing more than 22,000 admissions

annually (CHCF, 2018). To date, 36 U.S. states have medical cannabis laws and, of these, 14 states have recreational cannabis laws, including California (NCSL, 2021). Research estimating the impact of recreational cannabis laws with cannabis substance use disorders indicate that these laws have increased the proportion of the population experiencing cannabis use disorders (Cerdá et al., 2020). This research looks at early adopters of recreational cannabis laws and does not include data on California which legalized recreational use in 2016. The impacts of legalization of recreational cannabis use in California on the rates of cannabis use disorder have not yet been established in the literature.

The rates of cannabis use disorder vary by gender and race/ethnicity. Although women tend to be less likely to use cannabis or have a cannabis use disorder than men, women with cannabis use disorder are more likely to experience more severe withdrawal symptoms when attempting to quit (Wu et al., 2017). Further, cannabis use disorders are more common in Blacks, Native Americans, and Mixed-Race adults (Wu et al., 2017).

SUD Treatment

Treatments for SUD include residential, inpatient, and outpatient care using behavioral therapy, counseling, and/or prescription medication. Mutual help groups (e.g., Narcotics Anonymous) also support those with SUDs to establish and maintain sobriety. CM is used as a stand-alone treatment or as an adjunct to typical treatments for SUD and is described in detail below. Health care professionals note that relapse is common during the recovery process for many patients, with approximately 40% to 60% of patients returning to alcohol or drug use within one year of treatment, and when relapse occurs it is important for patients to work with their provider to resume or modify the treatment plan (McLellan et al., 2000; NIDA, 2017).

Contingency Management

CM is a type of behavioral therapy in which individuals are “reinforced,” or rewarded, for evidence of positive behavioral change or achievement of specified goals (Petry, 2011). Based on principals of behavioral analysis, CM has been assessed in the context of substance use treatments and typically consists of monetary-based rewards or vouchers to reinforce abstinence from the target drug and to promote medication compliance and treatment attendance (Petry, 2011). CM has been utilized as part of treatment for SUDs, including stimulants, opioids, marijuana, alcohol, and tobacco, and is often included as an adjunct to a specific SUD treatment such as cognitive behavioral therapy (CBT), medication-assisted therapy (MAT), and community reinforcement approach, although it is also used as a stand-alone treatment. Much of the research on the effectiveness of CM for SUD treatment has focused on stimulant use disorder. This is in part due to the rising increase in prevalence of and mortality related to stimulant use as well as due to the lack of effective treatments (such as MAT) for stimulant use disorder (Ronsley et al., 2020).

Detection

CM relies on detection of the target substance’s metabolites to biochemically confirm abstinence from use. Metabolites can be detected via urine, saliva, blood plasma, and breath samples (Dallery et al., 2015). Urine is most often used to detect metabolites from stimulants, cannabis, and non-synthetic opioids (Dallery et al., 2015). Detection of opioid use in urine can be complicated by the use of MAT, which may produce metabolites that are similar to those produced by opioid use (ASAM, 2017). Tobacco use can be monitored through either carbon monoxide levels in breath or cotinine levels found in saliva, plasma, or urine. If nicotine replacement therapy is being used as part of therapy, the best way to accurately measure tobacco use is through breathalyzers. Alcohol use can also be monitored via breath, saliva, plasma, or urine, but the relatively short length of time that ethanol can be detected in urine can be prohibitive for outpatient treatment programs that only monitor patients twice per week (ASAM, 2017). Detection method is selected based on characteristics of the target drug, costs of the detection method, feasibility, and acceptability to the patient (Dallery et al., 2015). Since urinalysis involves self-collection of

the specimen, patients are often monitored in order to ensure the sample has not been tampered with. This may cause additional discomfort and reduce the acceptability of the CM treatment to the patient. It can also be an additional burden for treatment programs to have trained staff members (typically same-sex for each patient) on hand to observe the sample collections. However, CM is not the only reason that treatment programs use urinalysis; they often do so anyway if they require abstinence to remain engaged in treatment or simply to monitor progress. Therefore, some programs may need to make adaptations to their existing protocols whereas others may already have processes in place for monitored urinalysis collection.

Behaviors to modify

The goal of CM is to modify behaviors related to substance use. Common CM goals include substance abstinence, treatment attendance, and/or medication compliance (for substances for which medication-assisted therapy or MAT is available). As noted by Prendergast et al. (2006), the duration of the behavior modification also varies.

Substance abstinence: Abstinence from the target substance is typically measured through collection of urine samples in order to capture all potential substance use within that week (Petry and Stitzer, 2002). Analysis of the urine sample is conducted either on-site through a purchased on-site test kit or sent out to an outside lab for analysis. The results from the on-site test kit can be ready within two to five minutes, whereas results from an outside lab can take between three and five days. It is preferred to conduct the analysis on site to ensure provision of immediate rewards for substance abstinence; immediacy of rewards is a defining element of behavior therapies such as CM.

Treatment attendance: CM can also be employed to increase attendance and participation in SUD treatment. SUD treatment clinics typically have attrition rates of 80% or higher, particularly among outpatient mental health treatment centers. Through utilizing reinforcers or rewards that are contingent on attendance, attendance rates may improve across a variety of treatment settings (Petry, 2012).

Medication compliance: The treatment of some SUDs (alcohol, opioids, and tobacco) includes FDA-approved medications. CM can target adherence to a medication regime (often referred to as MAT) to improve compliance through rewards for directly supervised ingestion of medications (Petry, 2012). Note: The CM specified in SB 110 is primarily used for stimulant and cannabis use disorders, for which there is no MAT. Therefore, the results described in the *Medical Effectiveness* section and the models estimated in the *Benefit Coverage, Utilization, and Cost Impacts* section do not include results related to medication compliance.

Structure of incentives

CM programs can vary in terms of how the incentive is structured and can use incentives in the form of vouchers, prizes, or cash. The vouchers have monetary value and can accumulate in a clinic-managed account as the patient remains substance-free. Instead of providing money directly to patients, program or clinic staff can use the earned amount in vouchers to purchase items requested by the patient that are reasonable and consistent with positive lifestyle change (e.g., no weapons, cigarettes) (Petry and Stitzer, 2002). Typically, patients purchase clothing, electronic equipment, sporting/hobby items, and recreational items with their vouchers. Items can also be stored in a space that CM studies refer to as a “prize cabinet” (Petry and Stitzer, 2002). The prize cabinet provides patients the opportunity to identify tangible prizes that may motivate them to continue treatment. The prize cabinet can consist of items ranging in value, from jumbo value (e.g., televisions, small appliances) to large or medium prizes (e.g., clothing store gift certificates, jewelry, decorative items) to small prizes (e.g., candy, toiletries) (Petry and Stitzer, 2002). Typically, patients in incentive programs earn at least one voucher for each urine sample that tests negative for the target substance. The structure of the incentive typically escalates, with each subsequent behavior being rewarded at a higher value than the previous one, thus incentivizing longer-term abstinence.

Structural and Attitudinal Barriers to Substance Use Disorder Treatment

Barriers to accessing treatment for SUDs, including treatment using CM, include provider- and patient-level factors. These barriers are described in more detail below.

Provider-Related Barriers

Provider supply including provider attitudes and geographic access can pose structural barriers to SUD treatment. Lack of available providers to treat SUDs in a specific geographic region, and more specifically a lack of providers who have been trained to administer CM as part of SUD treatment, will limit the extent to which patients can access treatment. Patients may also face supply issues or geographical and transportation barriers to accessing SUD treatment using CM (Dallery et al., 2015). A provider office would need to have the ability to monitor abstinence through urinalysis as well as the administrative capacity to administer the program. Provider willingness to treat SUDs using CM can also be limited; not all providers are comfortable offering CM programs due to a lack of training, lack of office space and support resources, cost, time pressure, or personal beliefs against using incentives to treat SUDs (HHS, 2018; McNeely et al., 2018; Dallery et al., 2015). Technological advancements in the field, such as web-based contingency management or smartphone technology, are addressing administrative barriers, including staffing and training, and have shown to increase patient compliance (Rash, 2016).

Patient-Related Barriers

For many patients with SUDs, attitudinal barriers are the most significant barrier to treatment initiation and persistence (Blanco et al., 2013). The stigma of SUD and the ability to acknowledge having an SUD can affect patient desire to seek care even more so for those who have co-occurring psychiatric conditions (Fisher et al., 2017; Verissimo and Grella, 2017). Many people with SUDs believe they can solve the problem themselves (Rapp et al., 2006). Rapp et al. (2006) tested a Barrier to Treatment Inventory tool to assess perceived barriers to treatment for those with SUDs. They reported significant correlation among six of the seven barrier factors: absence of a problem; negative social support; fear of treatment; privacy concerns; time conflict; poor treatment availability; and admission difficulty. Another barrier for patients participating in treatment specifically using CM is the requirement to travel to the provider's office, sometimes up to two or three times a week. This can cause more of a burden for patients who do not have flexible schedules and those who are living in areas with a shortage of providers who treat SUDs and a lack of access to providers that are administering CM programs (Dallery et al., 2015). However, when CM is administered as an adjunctive component of psychosocial treatments in the context of intensive outpatient programs (IOPs), patients are already traveling to attend therapy, where they will also submit their urine samples, the required two to three times per week.

Disparities¹³ and Social Determinants of Health¹⁴ in Substance Use Disorders

Per statute, CHBRP includes discussion of disparities and social determinants of health (SDoH) as it relates to the SUDs. Disparities are differences between groups that are modifiable, and insurance benefit mandates that impose coverage parity among state-regulated plans and policies may change an existing disparity.²⁷ SDoH include factors outside of the traditional medical care system that influence health status and health outcomes (e.g., income, education, geography).

¹³ Several competing definitions of “health disparities” exist. CHBRP relies on the following definition: Health disparity is defined as the differences, whether unjust or not, in health status or outcomes within a population. (Wyatt et al., 2016).

¹⁴ CHBRP defines social determinants of health as conditions in which people are born, grow, live, work, learn, and age. These social determinants of health (economic factors, social factors, education, physical environment) are shaped by the distribution of money, power, and resources and impacted by policy (adapted from: (CDC, 2014; Healthy People 2020, 2019). See CHBRP's SDoH white paper for further information: http://chbrp.com/analysis_methodology/public_health_impact_analysis.php.

Disparities in SUDs and treatment occur within many demographic categories in California such as race/ethnicity, gender, age, and sexual orientation. Taken as a whole, treatment of SUDs is inextricably linked bi-directionally with many important SDoH. SDoH such as quality of a person's local built environment, proximity to crime, educational opportunities, self-efficacy, and income levels can influence a person's risk for SUDs (Mooney et al., 2018; Sudhinaraset et al., 2016). Conversely, SUDs can also alter a person's baseline SDoH namely through the consequences of SUD, such as involvement with the criminal justice system, job loss, unstable housing or family situations, and discrimination against those with treated or untreated SUDs (Krebs et al., 2016).

Disparities for SUDs exist by gender, age, race, sexual orientation. Males tend to have higher rates of substance use disorders than females (Wu et al., 2017; Vasilenko et al., 2017). Young adults tend to have the highest prevalence of all SUDs, with most rates peaking in the 20s across gender and racial groups (Vasilenko et al., 2017). Although whites tend to have a higher prevalence of most SUDs in young adulthood, Blacks tend to have a higher prevalence in later life (Vasilenko et al., 2017). In addition, Blacks, Native Americans, and Mixed-Race adults have a higher prevalence of cannabis use disorder, regardless of age (Wu et al., 2017, Vasilenko et al., 2017). Further, lesbian, gay, and bisexual individuals are more likely to have SUDs, oftentimes more severe, than heterosexuals (Krueger et al., 2020; Philbin et al., 2020).

Another risk factor for SUD is related to mental illness. More than half of people with serious mental illness (SMI) also have an SUD, a combination which is referred to as dual diagnosis (Hunt et al., 2019). Patients with SMI have a particularly difficult time with addiction because substances are often used as a coping mechanism for mental health symptoms (Hunt et al., 2019). Treating SUDs is very important because individuals with dual diagnosis are at higher risk of hospitalizations, suicide, premature death, and criminal justice issues than individuals with SMI but no SUD (Schmidt et al., 2011).

Societal Impact of SUD in California

The presence of SUD in California has direct and indirect economic and societal costs. The California Department of Public Health estimates that SUD in California produces an estimated economic loss of over \$230 billion annually. Illicit drugs and misuse of prescription opioids account for \$18 billion, alcohol accounts for \$45 billion, and tobacco accounts for \$12 billion in direct health care costs (DHCS, 2013; Max et al., 2015). The remaining \$155 billion accounts for indirect costs, such as lost work productivity and crime (NIDA, 2017). Please note, the societal impact discussed here is relevant to a broader population than SB 110 impacts, which would affect the health insurance of a subset of Californians primarily for stimulant use disorder and cannabis use disorder (see *Policy Context*). See the *Benefit Coverage, Utilization, and Cost Impacts* section for estimates of direct cost impacts for the specific population targeted by SB 110.

MEDICAL EFFECTIVENESS

As discussed in the *Policy Context* section, SB 110 would require Medi-Cal to cover contingency management (CM) programs as a stand-alone treatment or an adjunctive component of a psychosocial/counseling-based substance use disorder (SUD) treatment program. Additional information on CM and SUDs is included in the *Background* section. Treatments for SUDs include residential, inpatient, and outpatient care using behavioral therapy, counseling, and/or prescription medication. CM is a type of behavioral therapy generally associated with outpatient SUD treatment in which individuals are “reinforced,” or rewarded, for evidence of positive behavioral change (Petry, 2011). The reinforcement typically targets abstinence from drug use, utilization of medications to treat SUDs, or attendance at treatment meetings, and can take the form of vouchers for goods, lottery entries for cash or prizes, or direct cash payments. Evidence indicates that CM has been utilized in treating SUDs, including stimulants, opioids, cannabis, alcohol, and tobacco. As SB 110 specifies inclusion of urinalysis, this analysis is limited to those SUDs for which routine urinalysis is commonly part of the CM program. Therefore, the medical effectiveness review summarizes findings from this evidence¹⁵ on the impact of CM for stimulant (including methamphetamines and cocaine) use disorder and cannabis use disorder only.¹⁶ Due to the wealth of literature, CHBRP limited its literature search to systematic reviews, meta-analyses, and Cochrane reviews and only presents data on individual studies in relation to specified components of SB 110 (e.g., urinalysis) that were only present in certain studies.

Research Approach and Methods

Studies on CM for SUDs published since 2015 were identified through searches on Medline, PubMed, the Cochrane Library, and PsycINFO to identify the most recent systematic reviews and meta-analyses. The search was limited to abstracts of studies published in English and current through February 23, 2021. Of the 207 articles identified, CHBRP identified 33 systematic reviews, 11 meta-analyses, and four Cochrane reviews. After reviewing the abstracts, 10 of those articles focused on stimulant (including methamphetamines and cocaine) use disorder and/or cannabis use disorder and met the quality standards necessary for this report. The other articles were eliminated because they did not follow specific guidelines for conducting systematic reviews or because they did not specifically review research related to CM or did not look at the outcomes of interest (as described below). A more thorough description of the methods used to conduct the medical effectiveness review and the process used to grade the evidence for each outcome measure is presented in Appendix B.

The conclusions below are based on the best available evidence from peer-reviewed literature.¹⁷ Unpublished studies are not reviewed because the results of such studies, if they exist, cannot be obtained within the 60-day timeframe for CHBRP reports.

Key Questions

1. What is the effectiveness of CM for treatment of SUDs compared to usual care for SUDs for the following disorders?

¹⁵ Much of the discussion in this section is focused on reviews of available literature. However, as noted in the section on Implementing the Hierarchy of Evidence on page 11 of the Medical Effectiveness Analysis and Research Approach document (posted at http://chbrp.com/analysis_methodology/medical_effectiveness_analysis.php), in the absence of fully applicable to the analysis peer-reviewed literature on well-designed randomized controlled trials (RCTs), CHBRP’s hierarchy of evidence allows for the inclusion of other evidence.

¹⁶ Other substances use disorders, including tobacco use disorder, alcohol use disorder, and opioid use disorder, were not included in the literature review due to these specifications. Brief descriptions of these SUDs are included in Appendix D.

¹⁷ Grey literature consists of material that is not published commercially or indexed systematically in bibliographic databases. For more information on CHBRP’s use of grey literature, visit http://chbrp.com/analysis_methodology/medical_effectiveness_analysis.php.

- a. Stimulant Use (including methamphetamines) Disorder
- b. Cannabis Use Disorder

Methodological Considerations

There is not one standard way to conduct CM for SUDs. This means that there are a range of ways to structure the reward offered for different targeted behaviors across SUDs. The CM program can vary in terms of the duration, incentive value, and format (cash, vouchers for goods, lottery, escalating vs. constant payouts, etc.). This lack of uniformity leads to difficulty in combining results across studies. In addition, although each substance is reviewed separately in this report, polysubstance use is common among those diagnosed with SUD, and many patients have more than one SUD. The diagnosis and treatment of multiple SUDs is complex and treatment and recovery rates for each SUD may vary for a single patient. It is possible for a patient to be in recovery from one SUD but not another. While some of the studies included in this review targeted multiple substances, CHBRP did not review each possible combination of substances separately to assess the impact of CM but rather focused on targeted outcomes for the two substances identified as relevant for this bill, stimulants (including methamphetamines and cocaine) and cannabis, both within the context of polysubstance use and as singular substances of misuse.

Outcomes Assessed

Studies of CM for cannabis and stimulant use disorder have primarily examined outcomes related to abstinence, treatment adherence, and treatment retention/attrition. All the reviewed studies reported abstinence from targeted drugs as a primary outcome. For these studies, abstinence was measured as the longest duration of continued abstinence (measured in weeks or in consecutive draws) or as the number or percentage of negative samples tested during the study period. For studies in which treatment retention and/or treatment adherence were primary outcomes, retention was defined as the number of weeks in treatment (i.e., showing up for counseling sessions), and adherence was defined as the number or percentage of scheduled appointments attended in a given time period. Secondary outcomes examined included health care utilization including emergency room visits and hospitalizations. For all of these studies, outcomes were reported during treatment, at the conclusion of treatment, and/or up to 12 months posttreatment. None of the studies reported follow-up evaluations past a 12-month follow-up.

Study Findings

This following section summarizes CHBRP's findings regarding the strength of evidence for the effectiveness of CM for SUDs. It begins with a broad overview description and evaluation of CM for SUDs and then focuses on the literature specific to stimulant (including methamphetamines and cocaine) and cannabis use disorder alone and in the context of polysubstance use disorder. It also describes the literature on CM for special populations, including pregnant women and persons with dual diagnoses, defined as having been diagnosed with both severe mental illness (SMI) and SUD, due to this population's unique struggles and susceptibility to SUDs. Some studies compared CM alone to treatment as usual while others compared CM as an adjunctive component of other psychosocial programs that are commonly used to treat SUDs (e.g., cognitive behavioral therapy [CBT]). In these cases, CM was used for the duration of treatment and ended at the conclusion of the treatment period.

Each section is accompanied by a corresponding figure. The title of the figure indicates the test, treatment, or service for which evidence is summarized. The statement in the box above the figure presents CHBRP's conclusion regarding the strength of evidence about the effect of a particular test, treatment, or service based on a specific relevant outcome and the number of studies on which CHBRP's conclusion is based. Definitions of CHBRP's grading scale terms is included in the box below, and more information is included in Appendix B.

The following terms are used to characterize the body of evidence regarding an outcome:

Clear and convincing evidence indicates that there are multiple studies of a treatment and that the large majority of studies are of high quality and consistently found that the treatment is either effective or not effective.

Preponderance of evidence indicates that the majority of the studies reviewed are consistent in their findings that treatment is either effective or not effective.

Limited evidence indicates that the studies have limited generalizability to the population of interest and/or the studies have a fatal flaw in research design or implementation.

Inconclusive evidence indicates that although some studies included in the medical effectiveness review found that a treatment is effective, a similar number of studies of equal quality suggest the treatment is not effective.

Insufficient evidence indicates that there is not enough evidence available to know whether or not a treatment is effective, either because there are too few studies of the treatment or because the available studies are not of high quality. It does not indicate that a treatment is not effective.

More information is available in Appendix B.

SUD Treatment Using Contingency Management

Contingency management for SUD — overview

Although individuals with SUDs are typically treated in the same SUD treatment programs together and often use or abuse more than one substance, studies examining the efficacy and effectiveness of CM typically focus on each substance individually given the variable patterns of use across substances. Therefore, the majority of the analyses conducted and conclusions drawn below are broken down by substance. Research on other relevant variables such as vulnerable populations are also worthy of consideration and have been summarized in systematic reviews. Biochemical verification of abstinence is common across all SUDs and is a standard component of most treatment programs. It is nearly universally present in CM programs given that reinforcements are typically made based on biochemically verified abstinence (Ainscough et al., 2017). However, substances are verified by different types of specimen collection. Urinalysis is most commonly used as a verification method for stimulants (including methamphetamine and cocaine) and cannabis (Donovan et al., 2012). Metabolites for stimulants in urine are typically detected for a time period of 48-72 hours, which aligns well with the typical time period between screens in treatment programs. Biochemical verification for cannabis presents challenges in terms of the amount of time it can be detected after use, which is highly dependent upon frequency and amount of use. Nevertheless, urinalysis is commonly used as a detection method for cannabis in treatment programs with modifications in terms of frequency and timing to account for potential longer-term storage in bodily tissue. Other types of biochemical verification, such as saliva, breath, and blood, are more common in other substances (Donovan et al., 2012).

Contingency management for SUD — program structure considerations

This review identified four systematic reviews that examined the structure of the CM program on outcomes. Davis et al. (2016) reviewed 69 studies of voucher-based CM programs enrolling a total of 2,675 people. Eighty-six percent of these studies reported positive treatment effects, with an overall standardized mean difference between CM and usual care groups of $d = 0.62$ (0.54–0.70). Lussier et al. (2006) also conducted a meta-analysis of 30 studies of voucher-based CM programs and found that greater effects were seen for immediate rewards compared to delayed rewards. They also found that the abstinence effect size was proportional to the size of the reward (Lussier et al., 2006). Benishek et al.

(2014) reviewed 19 studies enrolling 2,581 participants in prize-based CM studies. They found that prize-based CM was effective in increasing abstinence during treatment with an average treatment effect size of $d = 0.46$ (0.37–0.54). In another systematic review focused primarily on abstinence, Prendergast et al., (2006) found that among the 47 studies it reviewed, the three most frequently used types of CM were vouchers (55.3%), take home methadone doses (23.4%), and cash (21.3%).

Contingency management for SUD — reinforcement structure (scaling vs. static rewards)

A prominent program feature of CM is the reinforcement structure, which can either remain static over time regardless of the behavioral pattern that is being rewarded or vary depending on that pattern, typically increasing over time when the desired pattern is being consistently met. The latter is referred to as an “escalating” or “scaling” reinforcement system. For example, patients may receive \$1 for their first clean urinalysis and an increase of \$1 for each consecutive clean urinalysis up to a predetermined maximum amount. If they have a positive urinalysis, they would start over at \$1 for their first clean urinalysis after the positive. Most studies identified in this literature search used a scaling reinforcement structure. A recent review examined scaling (referred to as “escalating reinforcers” in the review) as a potential moderator of treatment effects (Ginley et al., 2021). They found that the vast majority (21/24) of studies that reported on this variable used a scaling system and that the long-term abstinence effects of these studies were stronger (OR = 1.23 [1.02, 1.48]) than those that did not use scaling (OR = 1.21 [.74, 1.97]). However, the difference between the two groups of studies did not reach statistical significance (Ginley et al., 2021). The low number of studies (3/24) that did not use scaling may have precluded a statistical relationship from being apparent.

Contingency management for SUD — reward value

The value of the rewards given in CM programs varies considerably in the literature. Although the amount that patients receive for the earliest negative samples are often relatively low (e.g., \$1), escalating values based on continuous abstinence enables them to receive rewards of higher value in relatively short periods of time. Maximum single rewards range from as little as \$0.45 to as much as \$25.89 (Sayegh et al., 2017), with maximal total earnings ranging from \$180 to \$1,155 over a 12-week period (Ginley et al., 2021). In a review of studies, the average total available to earn over 12 weeks was \$914.46 (median = \$466) (Ginley et al., 2021). Other studies that have extended longer than 12 weeks and/or used other types of reinforcement models have offered reward values up to \$3,201 across 24 weeks, \$2,294 in living expenses over 12 weeks, and \$5,800 worth of take-home methadone doses over 52 weeks (Ginley et al., 2021). One RCT (Petry et al., 2012) examined the relative effect of the total value of rewards on abstinence and attendance among individuals with stimulant use disorder in a methadone patient population. They found that patients offered larger prizes whose value maxed out at \$560 achieved longer durations of abstinence than those offered prizes whose value maxed out at \$250. Notably, as commonly seen with other CM studies, patients ultimately earned approximately 50-60% of the maximum amount available (\$303.4 [SD = 355.2]) in prizes in the \$560 condition but only approximately 25-30% of the maximum amount available (\$65.2 [SD = 108.6]) in prizes in the \$250 condition ($F(1,73) = 14.52, p < .001$) (Petry et al., 2012). This and other studies examining the effect of the magnitude of rewards on outcomes (e.g., Silverman, 1999) suggest that value matters but only to a certain amount, at which point the relative benefit plateaus and patients ultimately around 60% of the total amount offered (Ginley et al., 2021).

Contingency management for SUD — in the context of polydrug use

Polysubstance use is common among those diagnosed with SUD, and many patients have more than one SUD. The diagnosis and treatment of multiple use disorders is complex and treatment and recovery rates for each SUD may vary for each patient. It is possible for a patient to be in recovery from one SUD but not another and to target just one or more than one substance during treatment, depending on the rules and regulations of the treatment program. This issue becomes particularly complex considering that some substances (e.g., alcohol, opiates) are often medication-based or medication-assisted whereas others (e.g., stimulants, cannabis) are not due to a lack of effective medications.

An earlier review evaluated the impact of CM on drug use among patients in an outpatient methadone treatment program (Griffith et al., 2000). This meta-analysis of 30 studies included a total sample size of 1,568. An examination of the type of drug use targeted (opiates, cocaine, benzodiazepines) found that CM programs targeting a single drug had larger effect sizes than those targeting polydrug use (Griffith et al., 2000).

A more recent systematic review and meta-analysis (Ainscough et al., 2017) on CM for non-prescribed drug use during treatment for opiate addiction examined outcomes for all non-prescription drugs (cocaine, alcohol, tobacco, opiates, polysubstance). The review identified 22 studies including 2,333 total patients and pooled data on the longest duration of abstinence (LDA) and/or percentage of negative samples (PNS), where they were reported. LDA had a medium effect size ($d = 0.57$ (95% CI: 0.42–0.72)), and PNS had a small to medium effect size ($d = 0.41$ (95% CI: 0.28–0.54)). The authors found that CM was favored in all studies except one and favored in all substances except opiates. CM was also favored in all studies except those under 12 weeks duration (Ainscough et al., 2017).

Contingency management for SUD — in the context of serious mental illness/dual diagnosis

A recent systematic review and meta-analysis examined the effectiveness of CM on SUDs among patients with dual diagnoses, specifically focusing on psychotic disorders (Destoop et al., 2021). Five RCTs including 892 dual diagnosis patients were included in the meta-analysis. The substances of focus included cannabis (1 study), stimulants (1 study), alcohol (1 study), and tobacco (2 studies). The length of the interventions ranged from 22 days to three months, and the follow-up period in four of the studies ranged from six to 18 months. Collectively across studies, the authors found that CM was effective in terms of abstinence rates measured by the number of negative breath or urine samples after intervention (OR 2.13; 95% CI 0.97 to 4.69) and follow-up (OR 1.47; 95% CI 1.04 to 2.08). However, only the follow-up rate was statistically significantly different between groups, and this result should be interpreted with caution given the relatively higher attrition at the follow-up visit among CM patients (CM 30%, control 22%; RR 1.36, 95% CI 1.04 to 1.78). During the treatment period no differences in attrition were detected between CM and control patients (CM 42%, control 37%; RR 1.15, 95% CI 0.90 to 1.45) (Destoop et al., 2021).

The study included in that review that focused on dual diagnosis patients with stimulant use disorder (McDonnell et al., 2013) strongly favored CM in terms of percentage of participants with negative samples (OR=3.80 [1.65-8.72]) but not at follow-up (OR=1.57 [0.86-2.88]). Relative to patients in the control group, patients in the CM condition had higher attrition rates both during treatment (RR=1.65 [1.18, 2.31]) and at follow-up (RR=1.35 [0.83-2.20]), suggesting that a selection bias may have been present, whereby only patients who anticipated a negative sample were more likely to remain in treatment and attend sessions involving urine draws (McDonnell et al., 2013).

The study that focused on dual diagnosis among patients with cannabis use disorder (Sheridan Rains et al., 2019) did not detect differences in percentages of negative samples between CM and control groups during treatment (OR=1.11 [0.70-1.76]) or at follow-up (OR=1.21 [0.74-1.99]). No differences in attrition were detected between groups during treatment (RR=0.92 [0.72, 1.17]), but patients in the CM condition had higher attrition rates at follow-up (RR=1.43 [1.01-2.02]).

Contingency management for SUD — in the context of pregnancy

Considering the impact drugs and alcohol can have on unborn children and their future lives and the unique challenges that pregnant women face, pregnant women with SUDs comprise another vulnerable population worthy of special consideration. The criticisms CM and other psychosocial treatments for SUDs face become futile in the context of pregnancy since it is time limited and therefore aligns well with the short-term effectiveness of the CM model (Hand et al., 2017). A systematic review examining the effects of CM on pregnant women with SUDs identified a total of 27 articles, including seven RCTs targeting biochemically verified abstinence from illicit drug use (three cocaine, three cocaine and opioids, and one polydrug including stimulants and other drugs) and four RCTs targeting attendance at SUD

treatment programs (Hand et al., 2017). Two of the identified RCTs (Jones et al., 2001; Jones et al., 2000) targeted both abstinence and attendance and were therefore represented twice. Results from three RCTs targeting abstinence suggest that CM was more effective than TAU at reducing stimulant use in pregnant women controlling for or stratifying by baseline use. Although four of the RCTs targeting abstinence did not find a difference between CM, only one of those four studies control for baseline drug use (Hand et al., 2017).

Contingency management for SUD — effects over time

Since SUD is considered to be a chronic, relapsing disease, treatment effects often do not last beyond the time period in which they are applied. This is true for other behavioral treatments that are considered to be the “gold standard” such as CBT (Gates et al., 2016; Ronsley et al., 2020). This is also true for medication assisted therapies such as methadone and buprenorphine (Blanken et al., 2010; O’Connor et al., 2020), if the treatment period is not sufficiently long (often one or even many years). Thus, the long-term effects of a typical 12-week CM or CM + CBT program are expected to be limited (Ronsley et al., 2020). As with other short-term episodic treatments used for chronic conditions, it is anticipated that using CM for SUDs will require repeated treatment over time. Current practices involve short-term episodic treatments, which have limitations when treating long-term chronic conditions.

Prendergast et al. (2006) identified 46 randomized controlled trials (RCTs) or quasi experimental studies enrolling a total of 5,067 subjects. Overall, they calculated that the standardized mean difference (d) in drug use abstinence rates either during or at the end of treatment between the treatment group (using CM) and the control group (usual care) was 0.42 — representing a 22% difference in rates of drug use between groups (Prendergast et al., 2006). Across substances, they found that CM was more effective in achieving abstinence during treatment for cocaine use ($d = 0.66$) and opiate use ($d = 0.65$) compared with tobacco use ($d = 0.31$) or poly drug use ($d = 0.42$) (Prendergast et al., 2006). Across the 46 RCTs, attrition rates ranged from 0% to 65% with an average of 20.2%.

A meta-analysis (Sayegh et al., 2017) examined the short-term follow-up (F1; 0-3 months) and longer-term follow-up (F2; >3-6 months) effects of CM across all substances (stimulants, cannabis, tobacco, alcohol, opiates, and polysubstance) and calculated these effects for individual substances when an adequate number of articles were identified. Across all substances, CM had a significant medium effect across 35 studies that reported results at F1 ($d = .43$, 95% CI [.19, .66], $p < .001$), but failed to meet statistical significance across 18 studies that reported results at F2 ($d = .06$, 95% CI [-.10, .22], $p = .47$). They identified three for cannabis, which had a small effect at T1 ($d = .37$ [.02, .73], $p = .04$) but not T2 ($d = .33$ [-.01, .67], $p = .06$). They identified 11 for stimulants, which had a medium effect at T1 ($d = .62$ [.01, 1.24], $p < .05$). Of those 11 stimulant studies, seven had T2 datapoints, and the effect was not maintained ($d = .01$ [-.18, .19], $p = .95$). They identified eight for polysubstance, which had a small effect size at T1 ($d = .15$ [.00, .30], $p < .05$). Of those eight polysubstance studies, four had T2 datapoints, and the effect was not maintained ($d = -.06$ [-.36, .25], $p = .71$).

A recent review (Ginley et al., 2021) identified 23 studies, including 3,320 participants, that met its search criteria of high-quality RCTs evaluating long-term (up to 12 months) biochemically verified abstinence after reinforcement ended. They included studies that focused on stimulants, opioids, or polysubstance. At the long-term follow-up, the weighted average odds ratio (OR) effect size was 1.22, 95% confidence interval [1.03, 1.44], $p = .02$, indicating a statistically significant effect of CM on posttreatment, longer-term biochemically verified abstinence. The authors also examined the potential moderating effects of multiple variables including participant age, race/ethnicity, type of reinforcer, etc., and concluded that length of treatment was the only variable associated with improved longer-term outcomes, suggesting that longer-term active treatment may be associated with more durable long-term outcomes. Specifically, the authors (Ginley et al., 2021) found that a one-week increase in the duration of CM was associated with a 0.03 increase in the log odds ratio ($p = .04$, $k = 23$).

A review of 19 studies enrolling 2,581 participants in prize-based CM studies found that effects seen at the end of treatment were not maintained postintervention with effect sizes at three months of 0.33 (0.12–

0.54) and at six months of -0.09 (-0.28–0.10) (Benishek et al., 2014). Similar results were found in a meta-analysis of 14 articles on CM for stimulant use disorder (De Crescenzo et al., 2018).

Contingency management for stimulant use disorder

Of all substances, CM has been most widely studied in stimulant use disorder. Some studies examining CM as a treatment for stimulant use disorder focus only on specific types of stimulants (e.g., cocaine or methamphetamine), whereas others include all types of stimulants. Five systematic reviews and meta-analyses examining the effects of CM on stimulant use disorder were identified. Some (De Crescenzo et al., 2018; Ronsley et al., 2020) examine and compare CM along with other types of psychosocial treatments (e.g., CBT, MI) for SUDs, whereas others (Ainscough et al., 2017; Brown and DeFulio, 2020; Ginley et al., 2021) focus solely on CM. All of the systematic reviews and meta-analyses identified reported overwhelmingly positive effects of CM for stimulant use disorder in terms of treatment adherence, treatment retention, and biochemically verified abstinence during the course of treatment. Notably, a review of reviews on psychosocial treatments for stimulant use disorder (Ronsley et al., 2020) concluded that CM was the psychosocial treatment modality considered to have the best evidence of effectiveness. Moreover, a comprehensive systematic review and meta-analysis of 50 RCTs examining the effects of psychosocial interventions to treat stimulant use disorder using the PRISMA¹⁸ guidelines concluded that CM was effective both as a standalone treatment and as an adjunctive component of psychosocial treatment programs such as CBT and community reinforcement (De Crescenzo et al., 2018). These meta-analytic results are broken down according to this distinction below.

Contingency management for stimulant use disorder – CM alone

One review and meta-analysis (De Crescenzo et al., 2018) identified 14 articles that estimated the effect of CM compared to treatment as usual (TAU), which included a total of 1,984 participants and an average treatment length of 11.3 weeks (range: 8–16 weeks). Compared to TAU, CM had higher adjusted odds of abstinence at the end of treatment (OR=2.28; 95% CI: 1.50–3.45) and longest duration of abstinence at the end of treatment (OR=0.56; 95% CI: 0.41-0.71). However, there was no significant difference between CM and TAU groups in abstinence rates at the longest follow-up visit (OR=1.07; 95% CI: 0.79–1.44). In addition, they found that CM compared to TAU had lower attrition at the end of treatment (OR=0.65; 95% CI: 0.49–0.87).

Results were similar for the nine articles that estimated the effect of CM compared to non-contingent rewards (NCR), which included a total of 1,156 participants (De Crescenzo et al., 2018). Compared to NCR, CM had higher adjusted odds of abstinence at the end of treatment (OR=2.69; 95% CI: 1.61–4.51) and longest duration of abstinence at the end of treatment (OR=0.55; 95% CI: 0.19-0.90). CM also had a greater odds of higher abstinence rates at the longest follow-up relative to NCR (OR=2.08; 95% CI: 1.22–3.54). They found that CM and NCR did not differ in attrition at the end of treatment (OR=1.32; 95% CI: 0.84–2.07).

The authors (De Crescenzo et al., 2018) also meta-analyzed data from four articles including 395 participants comparing CM with other psychosocial interventions including CBT, community reinforcement approach (CRA), 12-step programs, and mindfulness-based therapy (MBT). Across these comparisons, CM routinely outperformed the comparison groups. For example, across four studies including 395 participants, CM outperformed CBT in terms of abstinence at the end of treatment (OR=0.43; CI: 0.27, 0.68) and CM maintained this relative improvement in the longest duration of abstinence at the end of treatment (OR=-0.65; CI: -0.96-0.34). However, no differences in attrition rates were detected between these two groups (De Crescenzo et al., 2018).

Contingency management for stimulant use disorder – CM + Psychosocial Treatments

CM has also been combined with other psychosocial treatment modalities such as CBT, the 12-step

¹⁸ Preferred Reporting Items for Systematic Reviews and Meta-Analyses

program, and the community reinforcement approach (CRA), which is an intervention that involves reinforcement at multiple levels such as family, social, recreational, and vocational as well as functional analysis and coping-skills training, and directly compared with other modalities and/or TAU or NCR (e.g., CBT + CM vs. TAU). The meta-analysis (De Crescenzo et al., 2018) examined all the different combinations of treatments that included CM and found that CM as an adjunctive component of different types of psychosocial treatments was generally effective in terms of the primary outcomes of interest.

For example, CM + CBT was superior to CBT alone in terms of abstinence at the end of treatment (OR = 2.00; 95% CI: 1.22-3.26) and longest duration of abstinence at the end of treatment (OR=0.63; CI: 0.31, 0.94) in the six studies including 553 participants that compared these two approaches (De Crescenzo et al., 2018). Higher abstinence at the end of treatment (OR = 3.16; 95% CI: 1.11-9.01) and marginally higher longest duration of abstinence at the end of treatment (OR=0.64; CI: 0.24, 1.04) for CM + CBT relative to NCR were found in the one study including 98 participants that compared these two groups. Similarly, one study including 60 participants reported higher abstinence at the end of treatment (OR = 3.28; 95% CI: 1.08-9.95) for CM + CBT relative to TAU (longest duration of abstinence was not reported). Notably, no significant differences in terms of abstinence or attrition were found in participants who received CM + CBT relative to those who received CM alone in the five studies including 563 participants that directly compared these treatments (De Crescenzo et al., 2018).

In their review and meta-analysis, the authors (De Crescenzo et al., 2018) found that of the combinations of psychosocial interventions evaluated, CM + CRA was the only combination that had significant adjusted odds of higher abstinence at all three time points examined: 12 weeks (OR = 7.60; 95% CI: 2.03–28.37), at the end of 24 weeks of treatment (OR = 2.84; 95% CI: 1.24–6.51), and at the longest follow-up period (average of 59.3 weeks) (OR = 3.08; 95% CI: 1.33–7.17). 0.008). Moreover, at end of treatment, CM + CRA had the highest number of statistically significant results in head-to-head comparisons relative to CBT (OR 2.44, 95% CI 1.02–5.88, P = 0.045), NCR (OR 3.31, 95% CI 1.32–8.28, P = 0.010), and the 12-step program + NCR (OR 4.07, 95% CI 1.13–14.69, P = 0.031). CM + CRA was also associated with fewer dropouts than TAU, both at 12 weeks and the end of treatment (OR 3.92, P < 0.001, and 3.63, P < 0.001, respectively). At the longest follow-up, CM + CRA was superior to CBT alone, CM alone, CM + CBT, and the 12-step program + NCR (ORs between 2.50, P = 0.039, and 5.22, P < 0.001).

Summary of findings regarding CM for stimulant use disorder: There is clear and convincing evidence from three systematic reviews of >30 RCTs that CM is more effective than treatment as usual with regard to abstinence during treatment and acceptability, including lower attrition and higher treatment adherence. There is limited evidence that CM is effective at improving abstinence rates 3-6 months posttreatment and clear and convincing evidence that CM is not effective at improving abstinence maintenance rates beyond six months posttreatment. These results held true for both CM alone and in combination with other psychosocial treatments, especially the community reinforcement approach.

Figure 1. CM for Stimulant Use Disorder Versus Treatment as Usual on Abstinence During Treatment and Treatment Retention

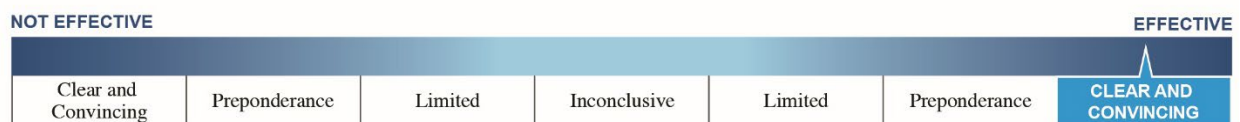
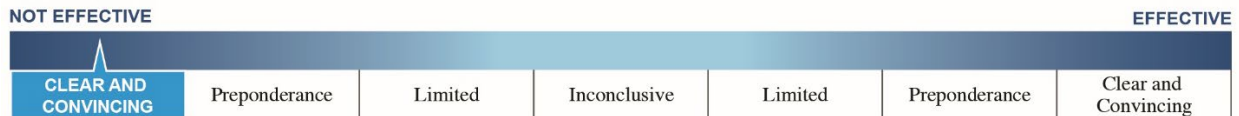


Figure 2. CM for Stimulant Use Disorder Versus Treatment as Usual on Abstinence 3-6 Months Posttreatment at Follow-Up



Figure 3. CM for Stimulant Use Disorder Versus Treatment as Usual on Abstinence >6 Months Posttreatment at Follow-Up



Contingency management for cannabis use disorder

Four systematic reviews were identified that reported on the use of CM for treating cannabis use disorder (Chatters et al., 2016; Cooper et al., 2015; Davis et al., 2015; Gates et al., 2016). These four reviews identified six RCTs with 868 total participants that examined the impact of CM on treatment for cannabis use disorder. These six studies reported an average value of the incentive of \$467 (\$250–\$590) across studies. CM alone or CM + CBT was more effective in achieving abstinence from cannabis than CBT or other behavioral therapies (Cooper et al., 2015). In addition, five out of six studies reported that CM was effective in increasing abstinence in terms of consecutive cannabis free urine samples and total cannabis free urine samples during treatment. Attendance was consistently reported at 61-69% of sessions across CM studies (Chatters et al., 2016). The literature did not indicate that CM appreciably increases attendance at treatment sessions (Gates et al., 2016). Only one of three studies looking at the impact of CM on treatment attendance found a statistically significant positive effect (Carroll et al., 2006).

Studies on the effect of CM for cannabis use disorder over time found conflicting results. One study found that CM in combination with CBT and MET was more effective in achieving abstinence at one year posttreatment compared to CBT plus MET alone (Kadden et al., 2007). An additional study found that there was a significant difference for CM + CBT compared to CBT alone up to nine months posttreatment, but not at 12 months (Budney et al., 2006). Studies among justice-involved individuals did not show a significant impact of CM on abstinence rates at 12 months posttreatment (Carroll et al., 2006; Carroll et al., 2012). There was no evidence that CM alone was significant in increasing abstinence rates at 12 months posttreatment.

Contingency management for cannabis use disorder – CM alone

One study (Budney et al., 2006) examined the effects of CM alone vs. CM + CBT vs. CBT alone on individuals with cannabis use disorder. They offered a 14-week treatment program during which participants were asked to submit urine tests twice per week (total of 28 tests). They found non-significant differences between groups in terms of mean (SD) number of urine samples provided: 17.9 (11.0) for CM, 17.5 (9.8) for CBT, and 19.2 (9.7) for CBT + CM, $F(2, 87) = 0.23, p = .80$. They also reported no significant differences in mean (SD) number of weeks out of 14 that participants were retained in treatment: 9.3 (5.2) for CBT, 10.7 (5.3) for CBT+ CM, and 9.5 (5.8) for CM, $F(2, 87) = 0.56, p = .57$. Participants in the CM only condition achieved higher rates of abstinence and more consecutive weeks of abstinence relative to those in the CBT only condition ($p = .02, d = .71$). No significant differences were apparent between the CBT + CM and the CM only conditions, suggesting that CBT did not enhance the positive effects of CM alone ($p = .32, d = .31$). Follow-up results indicated that the treatment effects of all three groups diminished over time. However, CBT + CM participants achieved significantly greater posttreatment abstinence levels than did CBT alone ($OR = 2.45 [1.01–5.93]$), suggesting that the

combination of the two treatments may lead to better lasting effects. In contrast, no difference between CM alone and CBT alone ($p = .74$) and a trend toward better outcomes for CM + CBT vs CM alone ($OR = 2.17 [0.91-5.17]$), were detected at follow-up, suggesting that the abstinence effect of CM is not lasting in the absence of the skills learned in CBT (Budney et al., 2006).

Another study (Kadden et al., 2007) used a dismantling design to determine whether adding CM to motivational enhancement therapy (MET) plus cognitive behavioral therapy (MET + CBT) would enhance abstinence outcomes. Participants were randomly assigned to one of four groups: MET + CBT, CM only, MET + CBT + CM, or a case-management control condition. The mean number of sessions attended out of overall was 5.2 ($SD = 3.5$), with no between-group difference in attendance ($F(3, 236) = 1.06; p > .36$). Planned contrasts examined differences across groups and only found a significant effect between CM and case management ($F(1, 214) = 4.13; p < .05$). Further analyses indicated that CM participants reported more days of abstinence than did case management participants but that this difference was only significant at posttreatment and not later follow-up time points. No differences between CM alone and CM + CBT or MET + CBT + CM were detected. Overall, CM alone was associated with the greatest proportion of days abstinent during treatment (as measured at posttreatment) and had the highest proportion of participants who had not yet relapsed at each follow-up assessment point.

Contingency management for cannabis use disorder – CM + Psychosocial Treatments

In the same study described above (Kadden et al., 2007), the CBT + MET + CM group was associated with the greatest number of participants who were abstinent late in the follow-up period and with the longest periods of continuous abstinence during the course of the follow-up year despite the CM alone group presenting with the most positive results at the posttreatment time point. These results suggest that CM is most useful in helping patients to achieve abstinence whereas the skills learned in CBT or similar psychosocial programs may be more useful in terms of maintaining abstinence (Kadden et al., 2007).

The four other studies that examined CM as an adjunctive component added to other psychosocial treatments generally favored CM, and they examined more specific questions related to the behaviors for which reinforcements were offered (Gates et al., 2016).

For example, in one study, MET + CBT + CM (rewarded for abstinence) intervention outperformed a MET + CBT + CM (rewarded for treatment adherence) intervention for up to 12 months (Litt et al., 2013). Another study (Carroll et al., 2006) examined the impact of CM on MET/CBT and drug counseling (DC), which was considered to be treatment as usual. Participants completed a mean of 5.1 of the 8 sessions offered ($SD = 2.5$), with significantly higher rates for the combination of CM + MET/CBT ($d = .45, 95\% CI: .05, .84$) and for CM compared with no CM ($d = .47, 95\% CI: .12, .81$). The overall retention rate was 60%, with significantly higher rates for those who were assigned to MET/CBT (MET/CBT + CM = 69.7%, MET/CBT without CM = 66.7%, DC + CM = 63.68%, DC without CM = 39.4%), MET/CBT versus DC, $\chi^2(1, N = 136) = 3.8, p = .05$. Abstinence results suggested that CM was associated with significantly longer durations of continuous abstinence ($t(124) = 2.1, p = .04, d = .45$), more consecutive marijuana-free urine samples ($t(127) = 2.7, p = .01; d = .29, 95\% CI: -.06, .63$), and significantly more total negative urine samples ($t(127) = 2.8, p = .01, d = .29, 95\% CI: -.06, .64$) than those not assigned to CM.

Summary of findings regarding CM for cannabis use disorder: There is a preponderance of evidence from six RCTs that CM alone or combined with other psychosocial treatments is effective in increasing abstinence from cannabis use during the treatment period, and inconclusive evidence to suggest that these results may persist in posttreatment follow-up.

Figure 4. CM for Cannabis Use Disorder Versus Treatment as Usual on Abstinence During Treatment

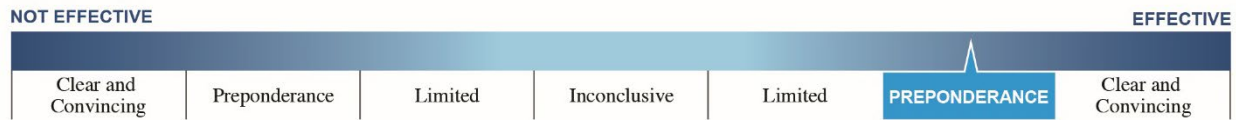


Figure 5. CM for Cannabis Use Disorder Versus Treatment as Usual on Abstinence at Posttreatment Follow-Up

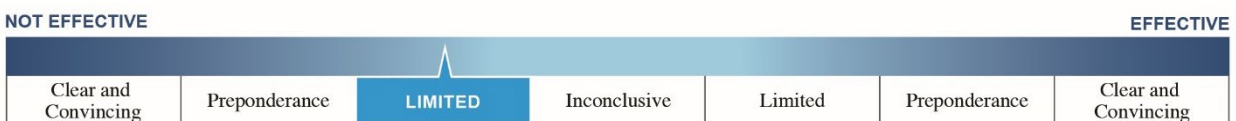


Impact of Contingency Management on Health Care Utilization

Secondary outcomes assessed by this literature review included the impact of CM on health care utilization such as emergency department visits and hospitalizations. A review by Olmstead et al. (2012) identified five RCTs enrolling 1,028 people that reported impacts on health care utilization related to treating cocaine, heroin, and alcohol use disorders with and without CM. While they found that over the study period, there was an increase in office visits and outpatient mental health visits and a decrease in hospitalization for mental health problems, there was no detected difference in the rates of change between the CM group compared to the standard care group (Olmstead et al., 2012). This led the study authors to conclude that there was no evidence of a change in health care utilization due to CM for SUDs in the long-term.

Summary of findings regarding impact of CM on health care utilization: There is limited evidence from one systematic review of five RCTs that CM is not effective in impacting health care utilization associated with outcomes related to treatment for SUDs.

Figure 6. Effectiveness of CM for SUDs Versus Treatment as Usual on Health Care Utilization



Harms Related to Contingency Management

Two potential harms from CM that have been explored in the literature are (1) the use of incentives reducing internal motivation to change and (2) incentives being sold or exchanged to purchase additional drugs, alcohol, or tobacco (Petry, 2010). One RCT addressed the question of incentives reducing internal motivation to change using 115 patients in community clinics for SUD treatment. They found that those randomized to receive CM did not have any reduced motivation to change (as measured by the University of Rhode Island Stages of Change Model) compared to those randomized to usual care (Ledgerwood and Petry, 2006). In addition, three studies have examined if CM leads to increased drug use (outside of the target drug) due to selling or exchanging the voucher for drugs (Festinger et al., 2005; Kadden et al., 2009; Petry et al, 2000). These three studies all found no evidence of an increase in ancillary drug use as a result of CM. Therefore, there is limited evidence to suggest that CM does not lead to an increase in harms such as reduction in motivation and increase in ancillary drug use.

Summary of findings related to harms of CM for the treatment of SUDs: There is limited evidence from four studies that CM is not associated with an increase in harms related to treatment for SUDs.

BENEFIT COVERAGE, UTILIZATION, AND COST IMPACTS

As discussed in the *Policy Context* section, SB 110 would allow some substance use disorder (SUD) treatment programs for Medi-Cal beneficiaries to include contingency management (CM) services, the available funds for CM inclusion to be decided annually by the California Legislature.

As discussed in the *Background on Substance Use Disorders and Treatment* section, CM programs related to SUD treatment generally involve giving patients tangible rewards such as prizes, cash, or vouchers to reinforce goal behaviors, such as abstinence, medication adherence, or greater/continued engagement with treatment. SUD services such as counseling are already a Medi-Cal covered benefit. CM is intended as a way to improve the outcomes of these services. CM is not a benefit that directly covers a health care screening, treatment, service, or item. Rather it is an incentive, analogous to, for example, incentive payments for members participating in wellness programs to encourage healthy behaviors.

As discussed in the *Policy Context* section, the Centers for Medicare and Medicaid Services (CMS) impose an annual maximum limit of \$75 per enrollee on incentives (Glass et al., 2020). As indicated in the *Medical Effectiveness* section, there needs to be a high enough incentive for CM services to be effective and change behavior. Effective minimum levels of incentive payments could be as high as \$600 per member, exceeding the current maximum of \$75 per member. Rules on the use of federal or state dollars under the Medicaid program for CM program payments is currently under consideration. For this analysis, CHBRP has assumed that incentive levels as high as \$600 per member for CM for SUD treatment would be allowed.

SB 110 specifies a CM program must include scaled incentives for specified behaviors. With the exception of that parameter, SB 110 does not specify how the Department of Health Care Services (DHCS) should implement CM for SUD. Therefore, in this section, CHBRP presents the incremental cost for implementing CM services for beneficiaries engaged in SUD treatment under two hypothetical programs: one for stimulant use disorders, and the other for cannabis use disorders. Each hypothetical program is based on 1,000 beneficiaries. Implementation of CM in Medi-Cal could involve large numbers of beneficiaries, but as the number of participants is unknown, CHBRP has presented a limited analysis that could potentially be expanded, as funding permits. The cost of expanding a program would be linear (twice as many participants would cost twice as much) although some administrative savings may be realized.

CHBRP has modeled CM as an addition to outpatient treatment for two SUDs. The first, stimulant use disorder, is an SUD for which acute impacts, such as overdose deaths, are likely. The second, cannabis use disorder, is an SUD for which acute impacts are not common. Models of CM as an addition for other SUDs would vary, depending on the SUD, the particulars of treatment, and the evidence of effectiveness.

The actual design of CM programs may differ materially from these hypothetical programs, but the selected programs are similar to programs in current use¹⁹ and to programs that have been evaluated in the scientific literature (Anderson et al., 2018; Davis et al., 2016; Prendergast et al., 2006; Roll et al., 2006).

The reasoning behind the selections for the particular designs modeled are as follows:

- CM program: CM can be used with a range of substance use treatment programs. CHBRP has modeled CM programs for the two SUDs for which immediate-result urinalysis (specified as a component of CM in SB 110) is common: stimulant and cannabis use disorder.
- CM added to an existing SUD treatment program: While CM programs also exist as standalone treatments, CM services are often provided in conjunction with SUD treatment programs.²⁰

¹⁹ Personal Communication, M. Stitzer, March 2021

²⁰ TBD

- CM duration (for a particular program): The estimated program length follows descriptions of CM efforts that have been evaluated in the scientific literature. Programs are most often 12 weeks; however, programs can vary from four weeks to 52 weeks (Prendergast et al., 2006). Although evidence suggests that extending CM for a longer period of time is associated with better outcomes, most of the scientific literature has tested 12-week programs, which also aligns with the typical length of outpatient treatment programs (Ginley et al., 2021). For these reasons, CHBRP has modeled CM as lasting 12 weeks for each of the examples.
- CHBRP has modeled two group counseling sessions per week for the stimulant program and one group counseling session per week for the cannabis treatment program. Participants are assumed to be required to provide a urine sample at each counseling session.
- CM goal behavior: Increased abstinence from drug use (as established by biochemically verified testing, such as urinalysis) and increased participation in treatment (as established by greater participation in counseling) are the primary outcomes described in the literature (see the *Medical Effectiveness* section). For this reason, CHBRP has modeled these goal behaviors in the examples presented in this section. It should be noted that there may be other CM goals that are not modeled below.
- CM reward: A variety of reward forms are documented in the literature, but vouchers for redemption of treatment program-approved objects (food, toiletries, etc.) are utilized most frequently in CM for SUD (Prendergast et al., 2006). For this reason, CHBRP has modeled rewards as vouchers.
- CM reward amount: A wide range of reward amounts are documented in the literature. Incentives over the course of the program ranged from a loss (patients gave a deposit that was at risk) to between \$45-\$1185 (Notley et al., 2019). For the hypothetical stimulant model, CHBRP modeled a scaling reward that starts at \$2 and increases \$2 for each consecutive additional negative urinalysis; a positive urinalysis would cause the scaling reward to start at \$2 again upon a negative urinalysis. For the hypothetical cannabis program, CHBRP modeled a scaling reward that starts at \$15 in week 3 and increases \$10 for each consecutive additional negative urinalysis; a positive urinalysis would cause the scaling reward to start at \$15 again upon a negative urinalysis. A cannabis positive urinalysis may result in future cannabis positive urinalysis even if the participant is abstinent given cannabis may remain in the system for 2-3 weeks. The stimulant model participant has 24 opportunities to receive a reward and the cannabis model participant has 10 opportunities to receive a reward. Based on these parameters, a participant could receive a maximum of \$600 for the hypothetical programs.

These hypothetical programs are presented for considering the possible utilization and cost of impacts of adding CM services to SUD treatment programs for Medi-Cal beneficiaries.

For further details on the underlying data sources and methods used in this analysis, please see Appendix C.

Benefit Coverage

All Medi-Cal beneficiaries have coverage for SUD treatment. Treatment for tobacco use disorder is through Medi-Cal managed care, which is obtained through enrollment of Medi-Cal beneficiaries in plans regulated by the Department of Managed Health Care (DMHC) or County Organized Health System (COHS) programs, or through Medi-Cal's FFS program. Treatment for stimulant, cannabis, and other substance use disorders for Medi-Cal beneficiaries is primarily through the statewide Drug Medi-Cal program (DHCS, 2019b).

Currently CM services are not mentioned as a covered Medi-Cal benefit (DHCS, 2019a). It is possible that CM programs run by certain SUD providers exist in California. However, CHBRP is unaware of any of those services being currently part of Medi-Cal covered benefits.

As the amount of funding that would be available, if any, is unknown, CHBRP has modeled a limited expansion, providing two examples that could be expanded, depending on the amount of available funds. Each hypothetical program is based on 1,000 beneficiaries.

Utilization

CHBRP assumes that CM services would be provided to Medi-Cal beneficiaries either enrolled or initiating enrollment in outpatient SUD treatment programs. As CHBRP is unaware of evidence to the contrary, CHBRP expects no increase in annual enrollment in SUD treatment in year one as a result of SB 110.

For Medi-Cal beneficiaries enrolled in outpatient SUD treatment programs with CM:

- For the duration of the CM program, SUD stimulant treatment attendance may increase (DePhilippis et al., 2018), which would result in increases in counseling and, depending on the design of the CM, increases in lab testing.
- For the duration of the CM program, CHBRP expects additional days of abstinence (Prendergast et al., 2006; De Crescenzo et al., 2018; Hagedorn et al., 2013; Anderson et al., 2018). However, CHBRP is unaware of evidence supporting measurably lowered use of SUD-related services, such as emergency department visits or hospitalization, during CM or throughout the remainder of the year after CM.
- For the duration of the CM program, as is often the case with greater engagement with SUD treatment programs, CHBRP expects some increase in use of health services not related to SUDs (Olmstead et al., 2012), such as dental appointments or annual screenings, but cannot quantify the utilization of such during or shortly after the duration of CM.

For the hypothetical stimulant program, CHBRP assumes an average of 70% attendance at group counseling sessions with CM, compared to an average of 60% attendance at group counseling sessions for the SUD treatment program without CM (Petry et al., 2005). Typically, CHBRP would expect to see attendance highest at the start of a program and decreasing over the duration of the program.

For the hypothetical cannabis program, CHBRP assumes an average of 60% attendance at group counseling sessions with and without CM. Typically, CHBRP would expect to see attendance highest at the start of a program and decreasing over the duration of the program.

CHBRP assumes all participants submit urine samples at each group counseling session they attend.

For the hypothetical stimulant program, CHBRP estimates 60% of the urine samples are negative for participants with CM compared to 40% for participants without CM. This is based on results found in the literature, although there could be significant differences in the participants and program parameters (Roll et al., 2006).

For the hypothetical cannabis program, CHBRP estimates 45% of the urine samples are negative for participants with CM compared to 30% for participants without CM. This is based on results found in the literature, although there could be significant differences in the participants and program parameters (Budney et al., 2006; Budney et al., 2000; Kadden et al., 2007; Carroll et al., 2006).

Cost

The per-unit cost of the reward vouchers is dependent on CM designs. For the purposes of modeling, CHBRP assumes a scaling reward where the per-unit cost of the reward vouchers will vary. For the stimulant SUD program, CHBRP assumes a \$2 initial reward for a negative urinalysis which increases in \$2 increments for each consecutive negative urinalysis. A positive urinalysis will cause the reward will revert to \$2 for the next negative urinalysis. (see details below). For the cannabis SUD program, CHBRP

modeled a scaling reward that starts at \$15 and increases \$10 for each consecutive additional negative urinalysis; a positive urinalysis will cause the scaling reward to start at \$15 again upon a negative urinalysis (Peirce et al., 2006).

CHBRP estimates there would be administrative costs associated with the availability of CM, as vouchers must be printed, vendor negotiations completed, vouchers stored in a theft-proof manner, the CM program offered to potential participants, results monitored, and vouchers distributed. Training costs are expected to be highest during the first year of implementation. There would also be ongoing administrative costs for the purchase, tracking, and distribution of rewards, vouchers, and other incentives. Administrative costs would vary according to the size and parameters of the program.

Hypothetical Contingency Management Services

Below are two hypothetical programs of CM services for SUD treatment programs, one related to stimulant use disorder and one related to cannabis use disorder.

Model 1: Twelve-Week Contingency Management Program Associated with Outpatient Treatment Program for Stimulant Use Disorder

The first hypothetical program is for CM added to an outpatient stimulant (includes methamphetamines and cocaine) use disorder treatment program. The treatment program, which runs 12 weeks, includes counseling and urine testing – which are covered services for Medi-Cal beneficiaries.

Following the overall structure of the stimulant use disorder treatment program, the CM program for Model 1 has the following parameters:

- At the SUD treatment provider's discretion, the CM program can begin at any time during the year, but each beneficiary can only participate in one 12-week CM program per year.
- Duration of the CM program addition to the SUD treatment program lasts 12 weeks for each beneficiary. The model describes total impact, but staggered enrollment could mean a provider offering CM throughout the entire year.
- The SUD treatment program includes group counseling sessions. The maximum number of outpatient counseling sessions a participant could attend during the 12 weeks of CM is 24 (2 sessions per week).
- Urine samples are collected and tested at each group counseling sessions for a maximum of 24 times during the 12 weeks of CM.
- For the first negative urine sample, participants receive a voucher for \$2 (redeemable at program-selected vendors for food, toiletries, and other program-approved items). For each participant, the voucher increases \$2 for each additional consecutive negative urine sample. A positive urine sample would cause the reward to revert back to \$2 for the next negative urine sample.
- The maximum cash value of the CM program per participant is \$600.

Table 1 below shows the expected costs for this hypothetical program with and without CM.

A stand-alone CM program would be expected to have lower expenditures due to lower utilization of counseling services.

Table 1. Expected Costs for Stimulant Use Disorder Treatment Program with and without Contingency Management for 1,000 Medi-Cal Beneficiaries

	Unit Cost	Rate	Total Utilization	Total Cost
SUD treatment without CM				
Group counseling sessions	\$21.00	60% (a)	14,400	\$302,400.00
Urinalysis	\$3.00	60% (b)	14,400	\$43,200.00
Total cost				\$345,600.00
SUD treatment with CM				
Group counseling sessions	\$21.00	70% (a)	16,800	\$352,800.00
Urinalysis	\$3.00	70% (b)	16,800	\$50,400.00
Reward cost per negative test	\$10.00 (c)	60% (d)	10,080	\$100,800.00
Administration of CM rewards				\$20,000.00 (e)
Total cost				\$524,000.00

Source: California Health Benefits Review Program, 2021.

Notes: (a) This is the expected average rate of attendance at group counseling.

(b) The expected rate of urine testing matches the expected average attendance at group counseling.

(c) The reward unit cost includes the cost of the voucher.

(d) This is the expected rate of urine samples negative for stimulants (includes methamphetamines and cocaine) for which vouchers would be rewarded.

(e) The administration cost includes only the cost of operating the CM rewards program, such as negotiating with vendors, the vendor cost of the voucher, and the cost of printing, securing from theft, and distributing vouchers.

As suggested in the *Background* and *Medical Effectiveness* sections and as projected in the *Public Health* section, additional desirable health outcomes are expected for beneficiaries participating in CM due to greater utilization of the SUD treatment program’s group counseling service. However, CHBRP does not project measurable cost offsets due to reductions in utilization of other health care services (such as emergency department visits) for intermittent or continuous abstinence during a 12-week SUD program as there is not sufficient evidence in the published literature to project any applicable cost offsets. Similarly, as there is not sufficient evidence to project additional posttreatment or long-term abstinence, no long-term offsets or savings are projected.

Model 2: Twelve-Week Contingency Management Program Associated with Outpatient Treatment Program for Cannabis Use Disorder

The second hypothetical program is for CM added to an outpatient cannabis use disorder treatment program. The treatment program, which runs 12 weeks, includes counseling and urine testing – which are covered services for Medi-Cal beneficiaries.

Following the overall structure of the cannabis use disorder treatment program, the CM program for Model 2 has the following parameters:

- At the SUD treatment provider’s discretion, the CM program can begin at any time during the year, but each beneficiary can only participate in one 12-week CM program per year.

- Duration of the CM program addition to the SUD treatment program lasts 12 weeks for each beneficiary. The model describes total impact, but staggered enrollment could mean a provider offering CM throughout the entire year.
- The SUD treatment program includes group counseling session. The maximum number of outpatient counseling sessions during the 12 weeks of CM is 12 (one session per week).
- Due to the longer amount of time cannabis is stored in the body and can therefore be detected in the urine, Urine samples are collected and tested once per week for a maximum of 12 times during the 12 weeks of CM.
- CM rewards begin at the third group counseling session as positive urinalysis test before the third week may be the result of cannabis use prior to the start of the program. During the program, a positive urinalysis may cause positive urinalysis in the following weeks even if the candidate does not use cannabis.
- For the first negative urine sample, participants receive a voucher for \$15 redeemable at program-selected vendors for food, toiletries, and other program-approved items). For each participant the voucher increases \$10 for each consecutive additional negative urinalysis; a positive urinalysis would cause the scaling reward to start at \$15 again upon a negative urinalysis. The maximum cash value of the CM program per participant is \$600.

Table 2 below shows the expected costs for this hypothetical program with and without CM. A stand-alone CM program would be expected to have lower expenditures due to lower utilization of counseling services.

Table 2. Expected Costs for Cannabis Use Disorder Treatment Program with and without Contingency Management for 1,000 Medi-Cal Beneficiaries

	Unit Cost	Rate	Total Utilization	Total Cost
SUD treatment without CM				
Group counseling sessions	\$21.00	60% (a)	7,200	\$151,200.00
Urinalysis	\$3.00	60% (b)	7,200	\$21,600.00
Total cost				\$172,800.00
SUD Treatment with CM				
Group counseling sessions	\$21.00	60% (a)	7,200	\$151,200.00
Urinalysis	\$3.00	60% (b)	7,200	\$21,600.00
Reward cost per negative test	\$20.00 (c)	45% (d)	3,240	\$64,800.00
Administration of CM rewards				\$13,000.00 (e)
Total cost				\$250,600.00

Source: California Health Benefits Review Program, 2021.

Notes: (a) This is the expected average rate of attendance at group counseling.

(b) The expected rate of urine testing matches the expected average attendance at group counseling.

(c) The reward unit cost includes the cost of the voucher.

(d) This is the expected rate of urine samples negative for cannabis for which vouchers would be rewarded.

(e) The administration cost includes only the cost of operating the CM rewards program, such as negotiating with vendors, the vendor cost of the voucher, and the cost of printing, securing from theft, and distributing vouchers.

As suggested in the *Background* and *Medical Effectiveness* sections and as projected in the *Public Health* section, additional desirable health outcomes are expected for beneficiaries participating in CM due to greater utilization of the SUD treatment program's group counseling service. However, CHBRP does not project measurable cost offsets due to reductions in utilization of other health care services (such as emergency department visits) for intermittent or continuous abstinence during a 12-week SUD program as there is not sufficient evidence in the published literature to project any applicable cost offsets. Similarly, as there is not sufficient evidence to project additional posttreatment or long-term abstinence, no long-term offsets or savings are projected.

Additional Administrative Expenses and Other Expenses

In addition to the administrative costs to providers running the CM programs in addition to SUD programs, there would be administrative costs incurred by the Department of Health Care Services and counties that administer the Medi-Cal program. CHBRP is unable to estimate such additional administrative costs that would accrue to the Medi-Cal program.

PUBLIC HEALTH IMPACTS

As discussed in the *Policy Context* section, SB 110 could create coverage of contingency management (CM) programs for treating substance use disorders (SUD) for some Medi-Cal beneficiaries. The public health impact analysis includes estimated impacts in the short term (within 12 months of implementation) and in the long term (beyond the first 12 months postmandate). This section estimates the short-term impact²¹ of SB 110 on abstinence, treatment adherence, medication adherence, and potential disparities.

Estimated Public Health Outcomes

CM is a type of behavioral therapy in which individuals are “reinforced,” or rewarded, for evidence of positive behavioral change (Petry, 2011). CM typically consists of monetary-based rewards or vouchers to reinforce abstinence from the target drug or to encourage retention in pharmacological or psychosocial treatment (Petry, 2011). As presented in the *Benefit Coverage, Utilization, and Cost Impacts* section, with the amount of funding that would be available unknown, CHBRP has purposefully modeled a limited expansion — for only 1,000 beneficiaries — intending to provide two examples that could be scaled larger, depending on the amount of available funds. These two examples, stimulant use disorder and cannabis use disorder, serve as case studies on what the cost and utilization implications would be of Medi-Cal enrollees getting treatment for SUD with and without CM. As presented in the *Medical Effectiveness* section, evidence varies by SUD regarding the impact of CM. While there is clear and convincing evidence that CM is effective for stimulant use disorder and a preponderance of evidence that CM is effective for cannabis use disorder, these findings are related to outcomes during treatment. For both stimulant use disorder and cannabis use disorder, it is not clear how this may impact results in posttreatment abstinence, but there is evidence to suggest that achieving abstinence during treatment is the greatest predictor of long-term recovery. The public health implications of these two simulations are discussed below.

Model 1: Stimulant Use Disorder

This simulation projected that for every 1,000 Medi-Cal enrollees engaged in treatment for stimulant use disorder, there would be 14,400 group counseling appointments and urinalysis tests without CM increasing to 16,800 with treatment including CM. As shown in Table 2, CM would lead to an additional 2,400 group counseling sessions per 1,000 enrollees attended and urinalyses performed. In absence of CM, 40% of the 14,400 urinalyses would be negative for stimulants for a total of 5,760 stimulant-free samples. With the addition of CM, it is expected that 60% of the 16,800 urine samples would be negative for a total of 10,080 negative samples. Therefore, for every 1,000 Medi-Cal enrollees engaged in treatment for stimulant use disorder using CM, CHBRP would expect to see an increase of 4,320 additional negative urine samples. Therefore, as each negative urine sample represents roughly three days of abstinence, this translates roughly into nearly 13,000 additional stimulant-free days.

SUD often involves cycles of relapse and remission, can vary in severity, and often requires ongoing professional treatment, lifestyle changes, and case management (ASAM, 2011; Goodwin and Sias, 2014). Therefore, although abstinence may not persist posttreatment, achieving periods of abstinence is still one goal of treatment, especially considering the best predictor of long-term recovery is abstinence during treatment (Carroll et al., 2006; Higgins et al., 2000; Petry et al., 2007). In addition, as there is no FDA-approved medication to treat stimulant use disorder, CM to improve treatment engagement and abstinence may be the best treatment option available.

Patients addicted to stimulants such as methamphetamine are at higher risk for a range of physical and psychological issues including mental illness, cognitive issues, antisocial behaviors, cardiovascular events, sexually transmitted diseases, and blood-borne infections including HIV and hepatitis B and C, and consequently are at increased risk of death (De Crescenzo et al., 2018). The rate of amphetamine-

²¹ CHBRP defines short-term impacts as changes occurring within 12 months of bill implementation.

related overdose deaths was 5.8/100,000 Californians in 2018 (2,427 deaths) (CDPH, 2019b). Methamphetamine has taken over as the leading cause of overdose deaths in California, followed by the rate of all opioid overdose deaths of 5.23/100,000 (CDPH, 2019b). In addition, impacts of methamphetamine use are exacerbated by its association with increased violence and crime (De Crescenzo et al., 2018). Other downstream effects of methamphetamine use include reduced work-related productivity and increased family and housing instability. It is possible that the additional 13,000 stimulant-free days among the 1,000 Medi-Cal enrollees in this simulation would lead to reductions in many of these short-term outcomes.

Disparities exist in the rates of overdoses due to amphetamines by race/ethnicity and gender. The California Opioid Overdose Surveillance Dashboard shows that Blacks had the highest rates of hospitalizations for amphetamine overdose (10.6/100,000), which were more than double rates of whites (5.76 per 100,000), Latinos (4.97 per 100,000), Native Americans (4.44 per 100,000), and Asians (0.69 per 100,000) (CDPH, 2019b). Yet, Native Americans had the highest amphetamine overdose mortality rates in California in 2018 (13.9/100,000), followed by Blacks and whites (9.9 deaths/100,000 and 9.5 deaths/100,000, respectively). Asians had the lowest amphetamine overdose mortality rate at 1.4/100,000 (CDPH, 2019b). Disparities by gender existed in the rates of ER visits for amphetamine overdoses and deaths with males being more than twice as likely to have an ER visit for an overdose (6.7/100,000 vs. 3.1/100,000) and more than three times as likely to die from amphetamine overdose (9.3 deaths/100,000 and 2.9 deaths/100,000, respectively) (CDPH, 2019b).

In the first year postmandate, CHBRP estimates that for every 1,000 Medi-Cal enrollees engaged in SUD treatment, adding CM to this treatment would result in an increase in 4,320 stimulant-free urine samples (13,000 stimulant-free days) and an increase in engagement in treatment for stimulant use disorder by 2,400 group counseling sessions. The quantitative impact of SB 110 on premature death associated with stimulant use is unknown; however, based on the effectiveness of CM for stimulant use disorders, it stands to reason that there could be some reduction in premature deaths due to overdose during periods of abstinence for those enrollees who undergo treatment for their SUD(s) as well as an increase in productivity due to an increased ability to work for those who are abstinent. In addition, due to higher rates of enrollment of Blacks in Medicaid, there is potential to reduce the disparity in overdose by race/ethnicity.

Model 2: Cannabis Use Disorder

This simulation projected that for every 1,000 Medi-Cal enrollees engaged in treatment for cannabis use disorder in absence of CM, 30% of the 7,200 urinalyses would be negative for cannabis for a total of 2,160 cannabis-free samples. With the addition of CM, it is expected that 45% of the 7,200 urine samples would be negative for a total of 3,240 negative samples. Therefore, for every 1,000 Medi-Cal enrollees engaged in treatment for cannabis use disorder using CM, CHBRP would expect to see an increase of 1,080 additional negative urine samples. Therefore, as each negative urine sample represents roughly seven days of abstinence, this translates roughly into more than 7,500 additional cannabis-free days.

The impacts of 7,500 additional cannabis-free days include reductions in risks of psychiatric disorders, impairments in learning and coordination, and lung inflammation/chronic bronchitis, and potential opportunities for improvements in cognitive function and educational and workplace outcomes (NIDA, 2019). There is also a potential for a reduction in ER visits and hospitalizations due to cannabis use disorder.

In the first year postmandate, CHBRP estimates that for every 1,000 Medi-Cal enrollees engaged in SUD treatment, adding CM to this treatment would result in an increase in 1,080 cannabis free urine samples (7,500 cannabis-free days). It stands to reason, based on the effectiveness of CM for cannabis use disorders, that there could be an increase in productivity due to an increased ability to work for those who are abstinent.

Benefit Mandate Structure and Unequal Racial/Ethnic Health Impacts

SB 110 would require compliance from the health insurance of all Medi-Cal beneficiaries but would not be applicable to the health insurance of other enrollees in DMHC-regulated plans or to any enrollees in CDI-regulated policies. People of color — Latinos, Blacks, Asians, and other non-Whites — represent a larger portion of Medi-Cal enrollees in DMHC-regulated plans (around 80%) and a smaller portion of commercial enrollees (55%). Therefore, it is possible that the passage of SB 110 could reduce disparities in SUD treatment where People of Color are more likely to get treatment for an SUD. It is not possible to qualify to what extent these disparities may be reduced by the passage of SB 110.

LONG-TERM IMPACTS

Some interventions in proposed mandates provide immediate measurable impacts (e.g., maternity service coverage or acute care treatments), while other interventions may take years to make a measurable impact (e.g., coverage for tobacco cessation or vaccinations). When possible, CHBRP estimates the long-term effects (beyond 12 months postmandate) to the public's health that would be attributable to the mandate. As presented in the *Medical Effectiveness* section, there is no research that examines the long-term impacts of CM for SUD treatment. For this analysis, CHBRP modeled a 12-week substance use disorder (SUD) treatment program using contingency management (CM), one for stimulant use disorder and one for cannabis use disorder. It is unclear how many providers would choose to offer CM as part of SUD treatment and how many patients would participate in the long term. In addition, since there is no research that examines long-term (> one year) impacts of CM for SUDs treatment on health care utilization, it is not possible to quantify the long-term utilization and cost impacts of SB 110.

As with other chronic conditions, effective management of SUDs will require repeated, short-term treatments or longer-term treatment over time. Current practices involve short-term episodic treatments, which have limitations when treating long-term chronic conditions. Of those that achieve long-term recovery, it is estimated that nearly half are able to enter recovery on the first try, 14% have one recurrence, 19% have 2-5 recurrences, and 15% have 6 or more recurrences prior to achieving recovery stability (McQuaid et al., 2017). It is estimated that between 2-5 recovery attempts are made by persons with stimulant use disorder and cannabis use disorder prior to successfully resolving the SUD (Kelly et al., 2019). Therefore, to the extent that participating in CM treatment programs produce better during-treatment abstinence results, this may encourage patients to try to make another recovery attempt in the future, with each attempt making it more likely they will enter long-term recovery.

As discussed previously, a key barrier to abstinence for any SUD is patient interest and readiness to abstain. It is possible that the availability of CM will attract more patients to participate in treatment in the first place. In addition, CHBRP anticipates that the demand for treatment of SUDs would continue as relapsed patients attempt abstinence again and first-time initiators would join the pool of patients seeking care. This in turn could contribute to long-term positive public health impacts, as programs become more available and patients become more aware of them over time. However, limited patient readiness for SUD treatment and limited number of providers may remain significant barriers to care.

To the extent that SB 110 results in an increase in SUD treatment with CM, and the extent to which this leads to additional quit attempts and long-term abstinence, it is possible SB 110 would contribute to reductions in substance use-related morbidity and mortality.

APPENDIX A TEXT OF BILL ANALYZED

On February 8, 2021, the Senate Health Committee asked CHBRP to analyze the version of SB 110 that was introduced on January 6, 2021.

On March 11, 2021, the Senate Health Committee asked CHBRP to analyze the language with proposed amendments. The version below includes those amendments.

AMENDED IN SENATE MARCH 15, 2021

CALIFORNIA LEGISLATURE— 2021–2022 REGULAR SESSION

SENATE BILL

NO. 110

**Introduced by Senator Wiener
(Principal coauthor: Assembly Member Chiu)
(Coauthor: Assembly Member Friedman)**

January 06, 2021

An act to add Section 14021.38 to the Welfare and Institutions Code, relating to Medi-Cal.

LEGISLATIVE COUNSEL'S DIGEST

SB 110, as amended, Wiener. Substance use disorder services: contingency management services.

Existing law provides for the Medi-Cal program, which is administered by the State Department of Health Care Services, and under which qualified low-income individuals receive health care services, including substance use disorder services that are delivered through the Drug Medi-Cal Treatment Program and the Drug Medi-Cal organized delivery system. The Medi-Cal program is, in part, governed and funded by federal Medicaid program provisions.

To the extent funds are made available in the annual Budget Act, this bill would expand substance use disorder services to include contingency management services, as specified, subject to utilization ~~controls~~ *controls, and would require contingency management services to be provided as one of the evidence-based practices within covered substance use disorder services*. The bill would require the department to issue guidance and training to providers on their use of contingency management services for Medi-Cal beneficiaries who access substance use disorder services under any Medi-Cal delivery system, including the Drug Medi-Cal Treatment Program and the Drug Medi-Cal organized delivery system. The bill would provide that contingency management services are not a rebate, refund, commission preference, patronage dividend, discount, or any other gratuitous consideration. The bill would authorize the

department to implement these provisions by various means, including provider bulletin, without taking regulatory action, and would condition the implementation of these provisions to the extent permitted by federal law, the availability of federal financial participation, and the department securing federal approval.

DIGEST KEY

Vote: majority Appropriation: no Fiscal Committee: yes Local Program: no

BILL TEXT

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1.

Section 14021.38 is added to the Welfare and Institutions Code, immediately following Section 14021.37, to read:

14021.38.

(a) To the extent funds are made available in the annual Budget Act for this express purpose, substance use disorder services shall include contingency management services as a covered benefit, subject to utilization controls, as described in Section 14133. Contingency management services shall include ~~all of the following components:~~ *an incentive structure, including, but not limited to, scaling rewards for continued evidence of specified behaviors or adherence to treatment goals, that rewards participants for specified behaviors, such as negative urinalysis.*

~~(1) Periodic urinalysis on patients.~~

~~(2) An incentive structure, which includes scaling rewards for continued evidence of specified behaviors or adherence to treatment goals, that rewards participants for specified behaviors, such as a negative urinalysis.~~

~~(3) Other supportive substance use disorder services, including counseling, therapy, or other proven medical alternatives, as necessary to meet the health needs of Medi-Cal beneficiaries.~~

(b) Contingency management services shall be provided as one of the evidence-based practices within covered substance use disorder services.

~~(b)~~

(c) The department shall issue guidance and training to providers on their use of contingency management services for Medi-Cal beneficiaries who access substance use disorder services under any Medi-Cal delivery system, including, but not limited to, the Drug Medi-Cal Treatment Program and the Drug Medi-Cal organized delivery system.

~~(c)~~

(d) Contingency management services are not a rebate, refund, commission preference, patronage dividend, discount, or any other gratuitous consideration, as described in Section 51478 of Title 22 of the California Code of Regulations.

~~(d)~~

(e) Notwithstanding Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, the department may implement this section by means of a provider bulletin or similar instruction, without taking regulatory action.

~~(e)~~

(f) For purposes of implementing this section, the department shall seek any necessary federal approvals, including approvals of any state plan amendments or federal waivers, by the federal Centers for Medicare and Medicaid Services.

~~(f)~~

(g) (1) This section shall only be implemented to the extent permitted by federal law.

(2) This section shall be implemented only to the extent that federal financial participation is available and any necessary federal approvals have been obtained.

APPENDIX B LITERATURE REVIEW METHODS

This appendix describes methods used in the literature review conducted for this report. A discussion of CHBRP's system for medical effectiveness grading evidence, as well as lists of MeSH Terms, publication types, and keywords, follows.

Studies of contingency management (CM) for substance use disorders (SUDs) were identified through searches of systematic reviews on PubMed, the Cochrane Library, and PsycINFO. The search was limited to abstracts of studies published in English and current through March 3, 2020. Of the 59 review articles identified, an additional eight review articles were identified through the process of reviewing articles for potential inclusion in this report on SB 110. In total, 22 studies were included in the medical effectiveness review for this report. The other articles were eliminated because they did not specifically review research related to CM or did not look at the outcomes of interest (as described below). A more thorough description of the methods used to conduct the medical effectiveness review and the process used to grade the evidence for each outcome measure is presented in Appendix B.

Reviewers screened the title and abstract of each citation retrieved by the literature search to determine eligibility for inclusion. The reviewers acquired the full text of articles that were deemed eligible for inclusion in the review and reapplied the initial eligibility criteria.

Medical Effectiveness Review

Studies on CM for SUDs published since 2015 were identified through searches on Medline, PubMed, the Cochrane Library, and PsycINFO to identify the most recent systematic reviews and meta-analyses. The search was limited to abstracts of studies published in English and current through February 23, 2021. Of the 207 articles identified, CHBRP identified 33 systematic reviews, 11 meta-analyses, and four Cochrane reviews. After reviewing the abstracts, 10 of those articles focused on stimulant (including methamphetamines and cocaine) use disorder and/or cannabis use disorder and met the quality standards necessary for this report.

Medical Effectiveness Evidence Grading System

In making a "call" for each outcome measure, the medical effectiveness lead and the content expert consider the number of studies as well the strength of the evidence. Further information about the criteria CHBRP uses to evaluate evidence of medical effectiveness can be found in CHBRP's *Medical Effectiveness Analysis Research Approach*.²² To grade the evidence for each outcome measured, the team uses a grading system that has the following categories:

- Research design;
- Statistical significance;
- Direction of effect;
- Size of effect; and
- Generalizability of findings.

The grading system also contains an overall conclusion that encompasses findings in these five domains. The conclusion is a statement that captures the strength and consistency of the evidence of an intervention's effect on an outcome. The following terms are used to characterize the body of evidence regarding an outcome:

- *Clear and convincing evidence;*
- *Preponderance of evidence;*

²² Available at: http://chbrp.com/analysis_methodology/medical_effectiveness_analysis.php.

- *Limited evidence*;
- *Inconclusive evidence*; and
- *Insufficient evidence*.

A grade of *clear and convincing evidence* indicates that there are multiple studies of a treatment and that the large majority of studies are of high quality and consistently found that the treatment is either effective or not effective.

A grade of *preponderance of evidence* indicates that the majority of the studies reviewed are consistent in their findings that treatment is either effective or not effective.

A grade of *limited evidence* indicates that the studies had limited generalizability to the population of interest and/or the studies had a fatal flaw in research design or implementation.

A grade of *inconclusive evidence* indicates that although some studies included in the medical effectiveness review found that a treatment is effective, a similar number of studies of equal quality suggest the treatment is not effective.

A grade of *insufficient evidence* indicates that there is not enough evidence available to know whether or not a treatment is effective, either because there are too few studies of the treatment or because the available studies are not of high quality. It does not indicate that a treatment is not effective.

Search Terms (* indicates truncation of word stem)

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| <ul style="list-style-type: none"> • Alcohol Abuse/Addiction/Dependence/Disorder • Amphetamine Abuse/Addiction/Dependence/Disorder • Cannabis Abuse/Addiction/Dependence/Disorder • Cannabis Use Disorder • Cigarette Abuse/Addiction/Dependence/Disorder • Cocaine Abuse/Addiction/Dependence/Disorder • Crack Abuse/Addiction/Dependence/Disorder • Drug Abuse/Addiction/Dependence/Disorder • Marijuana Abuse/Addiction/Dependence/Disorder • Meth Abuse/Addiction/Dependence/Disorder • Methamphetamine Abuse/Addiction/Dependence/Disorder • Nicotine Abuse/Addiction/Dependence/Disorder | <ul style="list-style-type: none"> • Opiate Abuse/Addiction/Dependence/Disorder • Opioid Abuse/Addiction/Dependence/Disorder • Polydrug Abuse/Addiction/Dependence/Disorder • Polysubstance Abuse/Addiction/Dependence/Disorder • Smoking Abuse/Addiction/Dependence/Disorder • Stimulant Abuse/Addiction/Dependence/Disorder • Substance Abuse Detection • Substance-Related Disorders • Substance Abuse/Addiction/Dependence • Substance Use Disorders • Tobacco Abuse/Addiction/Dependence/Disorder • Behavioral Contracts • Behavioral Economic Supplements | <ul style="list-style-type: none"> • Behavioral Economics • Contingency Management • Deposit of Money/Credit • Incentives • Lottery • Monetary Incentives • Monetary Rewards • Non-Scaled Incentives • Prizes • Rewards • Scaled Incentives • Token Economy • Vouchers • Alcohol Drinking/Urine • Amphetamines/Urine • Cocaine Smoking/Urine • Cocaine/Urine • Ethanol/Urine • Methamphetamine/Urine • Narcotics/Urine • Nicotine/Urine • Tobacco Smoking/Urine • Tobacco Use/Urine • Urinalysis |
|--|--|--|

APPENDIX C COST IMPACT ANALYSIS: DATA SOURCES, CAVEATS, AND ASSUMPTIONS

The cost analysis in this report was prepared by the members of the cost team, which consists of CHBRP task force members and contributors from the University of California, Los Angeles, and the University of California, Davis, as well as the contracted actuarial firm, Milliman, Inc.²³

Information on the generally used data sources and estimation methods, as well as caveats and assumptions generally applicable to CHBRP's cost impacts analyses, are available at CHBRP's website.²⁴

This appendix describes analysis-specific data sources, estimation methods, caveats, and assumptions used in preparing this cost impact analysis.

Analysis-Specific Caveats and Assumptions

This subsection discusses the caveats and assumptions relevant specifically to an analysis of SB 110.

CHBRP presented two hypothetical programs of typical SUD outpatient treatment programs. Programs and CM structure have significant variation. The examples presented in this analysis are potential approaches for designing a CM program. Other approaches could result in significantly different costs.

- The average costs for group counseling sessions and urinalysis are based on an analysis of Medi-Cal paid claims.
- The reward amounts and annual maximum reward per participant were chosen based on common incentives in the literature (Budney et al., 2006; Budney et al., 2000; Kadden et al., 2007; Carroll et al., 2006).
- For the stimulant use disorder example, CHBRP assumed:
 - An attendance rate of 60% for an SUD outpatient treatment program without CM and an attendance rate of 70% for an SUD outpatient treatment program with CM (Petry et al., 2005).
 - 60% of the urinalysis were negative for the outpatient SUD treatment program with CM (Roll et al., 2006).
- For the cannabis use disorder example, CHBRP assumed:
 - An attendance rate of 60% for both an SUD outpatient treatment program without CM and for an SUD outpatient treatment program with CM (Budney et al., 2006; Budney et al., 2000; Kadden et al., 2007; Carroll et al., 2006).
 - 45% of the urinalysis were negative for the outpatient SUD treatment program with CM (Budney et al., 2006; Budney et al., 2000; Kadden et al., 2007; Carroll et al., 2006).

Reward voucher amounts are based reward amounts for similar SUD treatment programs identified in the relevant CM literature (Budney et al., 2006; Budney et al., 2000; Kadden et al., 2007; Carroll et al., 2006).

²³ CHBRP's authorizing statute, available at http://chbrp.com/CHBRP_authorizing_statute_2018_FINAL.pdf, requires that CHBRP use a certified actuary or "other person with relevant knowledge and expertise" to determine financial impact.

²⁴ See method documents posted at http://chbrp.com/analysis_methodology/cost_impact_analysis.php; in particular, see *2021 Cost Analyses: Data Sources, Caveats, and Assumptions*.

APPENDIX D CONTINGENCY MANAGEMENT AND OTHER SUBSTANCE USE DISORDERS

For five substance use disorders (opioids, stimulants, cannabis, alcohol, and tobacco) contingency management (CM) may be included as a component of treatment (Davis et al., 2016; Prendergast et al., 2006). Because SB 110 specifies urinalysis as a possible component of CM, this analysis has focused on CM for stimulant (includes methamphetamines and cocaine) and cannabis use disorders. However, the language of SB 110 would not prohibit support of CM for other SUDs and so information related to CM as a treatment for alcohol use disorder, tobacco use disorder, and opioid use disorder is presented in this appendix. The text of this appendix was taken from CHBRP's 2020 analysis of SB 888 which would have been more clearly applicable to CM as treatment for all five SUDs.

Alcohol Use Disorder

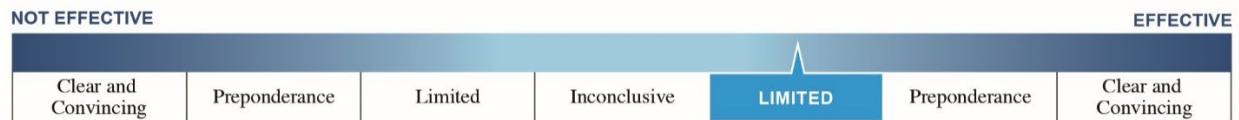
Alcohol use disorder is the third leading cause of preventable mortality in the United States. Excessive alcohol use increases the risk of developing serious acute and chronic health problems, including but not limited to brain damage (including dementia), liver disease, heart disease, immunosuppression and infections, hypertension, cancers, depression, pancreatitis, fetal alcohol syndrome, and traumatic injuries or deaths from falls, car accidents, physical altercations, suicide, and homicide (NIAAA, 2018). It is estimated that 6.3% of California adults reporting alcohol use disorder (SAMHSA, 2019b). Alcohol misuse in California led to approximately 119,600 nonfatal emergency room visits and 30,000 nonfatal hospitalizations for alcohol-related injuries and poisonings each year (CDC, 2013). It is also estimated in California that there are 10,671 alcohol-attributed deaths from both chronic and acute causes (CDC, 2013). Alcohol use disorder-related disparities among racial/ethnic groups exist in California with whites and Native Americans exhibiting the highest rates of heavy drinking, although Hispanics and Blacks have higher rates of alcohol-related liver disease and cirrhosis mortality (NIAAA, 2019). Similar to other SUDs, younger cohorts (aged 18-34 years) report higher rates of heavy drinking as compared with other ages; similarly, the LGBT population reported higher rates of binge drinking than the heterosexual population (Ward et al., 2014).

Contingency management for alcohol use disorder

Gao et al. (2018) conducted a systematic review of 137 RCTs of interventions for alcohol use disorder. Of these, 11 trials enrolling 885 participants compared CM plus psychotherapy to psychotherapy alone. This meta-analysis found that CM plus psychotherapy was more effective than psychotherapy alone in six of the 11 studies for an overall adjusted odds ratio of abstinence measured during treatment sessions of 2.191 (95% CI: 1.29–3.72). The largest of these 11 studies was conducted by Hagedorn et al. (2013). This study enrolled 191 patients in the VA in a CM trial. This study found that compared to usual care, the CM group was more likely to submit an alcohol negative urine sample (82.3% vs. 67%), to have a longer period of continuous abstinence (7.16 weeks vs. 6.22 weeks), and to complete more SUD treatment visits (16 vs. 9) (Hagedorn et al., 2013).

Summary of findings regarding CM for alcohol use disorder: There is limited evidence from one systematic review of 11 low to moderate quality RCTs that CM is more effective than treatment as usual, with regard to abstinence during treatment.

Figure 7. CM for Alcohol Use Disorder Versus Treatment as Usual on Abstinence Rates During Treatment



Tobacco Use Disorder

Tobacco is the name of a class of plants that contains the addictive substance nicotine. Public health campaigns, smoking policy changes (tobacco taxation, sales restrictions, workplace restrictions, etc.), and insurance coverage of cessation therapies have contributed to California having the second lowest rate of adult smoking in the United States (CDC, 2020a). There is a robust body of literature demonstrating poor health outcomes associated with smoking, including cardiopulmonary disease, cancer, dental disease, and poor fetal outcomes (e.g., low birth weight, stillbirth, preterm delivery) (CDC, 2020b). Tobacco use disorder prevalence in California is 11.2% among adults (based on all tobacco products) (CDC, 2019). While this percentage is lower than the majority of states, California still has the largest number of smokers due to the size of its population (3.2 million adult smokers) (CDPH, 2019b). Tobacco use is the leading cause of preventable illness and death in the United States and California. The CDC estimates that smoking and exposure to tobacco smoke account for approximately 40,000 deaths annually in California.

Contingency management for tobacco use disorder

Notley et al. (2019) conducted a Cochrane systematic review of CM for patients with tobacco use disorder (33 studies; 21,600 participants). The primary outcome examined in this systematic review was posttreatment (following months) smoking cessation. This was defined in a variety of ways and included both point prevalence and continuous abstinence at a minimum of six months. Abstinence was reported as biochemically validated at an in-person visit. They found that there was a significant difference in quitting tobacco use at six months between those offered incentives and those not offered incentives (risk ratio [RR] = 1.49; 95% CI: 1.28–1.73). The incentives ranged from zero (patients gave a deposit that was at risk) to between \$45 and \$1185. There was no clear effect of the size of the incentive on the cessation outcomes. Notley et al. (2019) also distinguished between studies of the general population and pregnant women (10 studies; 2571 pregnant women). The studies of pregnant women found that the use of incentives resulted in an increase in cessation at 24 weeks postpartum of 2.38 (95% CI: 1.54–3.69).

Anderson et al. (2018) published a study on CM for tobacco use cessation among Medi-Cal enrollees in California in December, 2018 that was published after Notley et al. (2019) conducted their systematic review. This study is relevant in that it is the population targeted by SB 888 (Medi-Cal enrollees), and utilizes the California Smokers' Helpline (Helpline), a toll-free counseling quit line conducted in multiple languages to help Californians quit smoking. As the California Department of Health Care Services requires coordination between Medicaid managed care plans and the Helpline to address tobacco use, the Helpline has become a key component of tobacco cessation programs in Medi-Cal managed care plans in California (DHCS, 2016). Medicaid enrollees who called the Helpline were randomized into one of three trial arms: usual care, receipt of nicotine patch, and patch plus CM. The CM group was paid for each call they made to the Helpline for cessation counseling. They found that the CM plus patch group had higher rates of abstinence at six months (13.2%) compared to the patch (10.3%) or usual care group (9.0%) (p-values = 0.02 and 0.017). In addition, they found that the patch plus CM group had a higher number of calls to the Helpline (6.2, 95% CI: 5.9–6.4) compared to the patch group (5.1, 95% CI: 4.8–5.3) or the usual care group (5.0, 95% 4.6–5.2).

Summary of findings regarding CM for tobacco use disorder: There is clear and convincing evidence from one systematic review of 33 RCTs that CM is more effective than treatment as usual in reducing rates of tobacco use during treatment and at six months. In addition, there is clear and convincing evidence from 10 RCTs of pregnant women who smoke, that CM is more effective than treatment as usual in reducing rates of tobacco use at six months.

Figure 8. Effectiveness of CM for Tobacco Use Disorder Versus Treatment as Usual on Abstinence During Treatment

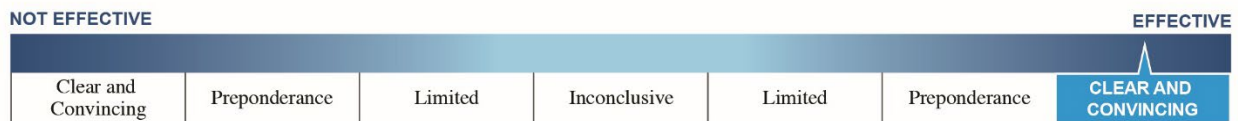
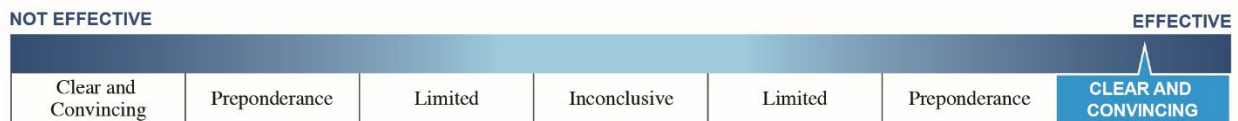


Figure 9. Effectiveness of CM for Tobacco Use Disorder Versus Treatment as Usual on Abstinence Rates at Six Months



Opium Use Disorder

Opioids are a class of drugs that include prescription pain relievers, synthetic opioids such as fentanyl, and the street drug, heroin. In 2017, the U.S. Surgeon General declared the opioid crisis a U.S. public health emergency due to the escalating rates of opioid overdose, and related mortality and other harms (HHS, 2018). In addition to a greater risk of mortality, people with opioid use disorder are at a higher risk for developing cardiac dysrhythmias, respiratory depression, and impairment in daily function (Blanco et al., 2013). Opioid use during pregnancy is one of the leading causes of neonatal abstinence syndrome – a withdrawal syndrome which can lead to long-term health and developmental problems (MOD, 2019). Opioid use disorder prevalence in California is 0.62% among people aged 12 years and older (SAMHSA, 2020a). Heroin use in the past year is reported among 0.20% of California adults (SAMHSA, 2020a). Pain reliever misuse in the past year is reported among 3.87% of California adults (SAMHSA, 2019b). In addition, the California Opioid Overdose Surveillance Dashboard provides a variety of statistics about California’s experience with opioid, stimulant, and cannabis misuse, including information about emergency department (ED) use and hospitalizations. They found that 8,832 Californians (24 per 100,000) were seen in EDs and 3,672 (8 per 100,000) were hospitalized for opioid overdose in 2017 (CDPH, 2019b). It is also estimated that there are approximately 2,196 deaths from opioid use disorder, each year in California (CDPH, 2019b). Disparities in opioid overdose mortality rates, hospitalizations, and emergency department use exist among racial/ethnic groups (highest among whites and Native Americans); age cohorts (highest among those aged 25–35); and by gender (males have two times the mortality rate of females) (CDPH, 2019b). The LGBT population is twice as likely as the heterosexual population to report misusing prescription opioids (NIDA, 2017).

Contingency management for opioid use disorder

Two systematic reviews were identified that addressed CM for the treatment of opioid use disorder. Timko et al. (2016) and Dugosh et al. (2016) conducted systematic reviews that identified six articles enrolling a total of 1,259 patients in RCTs (5 studies) and a prospective observational study that addressed CM for patients using medication-assisted treatment (MAT) for opioid use disorder. These six studies reported an average value of the incentive of \$470 (\$41–\$1,460) across studies. Three of these studies addressed

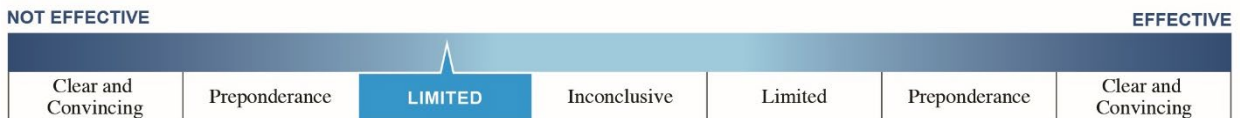
the use of CM in a general population of MAT users. Two of the three studies found that CM increased retention of MAT at three months and that the patients in the CM group provided more opioid-free urine samples (Chen et al., 2013; Hser et al., 2011; and Ling et al., 2013). Chen et al. (2013) and Hser et al. (2011) found that at three months, 81% of the patients in the methadone plus CM group were still in treatment compared to 67% of those in the usual care group. One study (Kidorf et al., 2013) found that CM was not effective in increasing treatment adherence or abstinence among psychiatric patients with opioid use disorder. Another study found that CM was effective in improving adherence to MAT, but not abstinence rates for patients who were required to use MAT in order to access employment opportunities (Dunn et al., 2013). Gerra et al. (2011) found that there was no difference in abstinence rates for patients who were allowed to take home seven days of MAT if they had a negative urine sample compared to patients who had to come in each day to receive their MAT.

Summary of findings regarding CM for opioid use disorder: There is limited evidence from two systematic reviews of six studies that CM is more effective in improving abstinence rates during treatment and keeping patients retained in MAT compared to patients in usual care. There is also limited evidence that CM for opioid use disorder is not effective in improving rates of abstinence posttreatment.

Figure 10. Effectiveness of CM for Opioid Use Disorder Versus Treatment as Usual on Retention in Treatment and Abstinence During Treatment



Figure 11. Effectiveness of CM for Opioid Use Disorder Versus Treatment as Usual on Abstinence at Follow-Up



APPENDIX E INFORMATION SUBMITTED BY OUTSIDE PARTIES

In accordance with the California Health Benefits Review Program (CHBRP) policy to analyze information submitted by outside parties during the first two weeks of the CHBRP review, the following parties chose to submit information.

The following information was submitted by Robert Harris in by in February 2021.

https://www.researchgate.net/publication/7131279_Budney_AJ_Moore_BA_Rocha_HL_Higgins_ST_Clinical_trial_of_abstinence-based_vouchers_and_cognitive-behavioral_therapy_for_cannabis_dependence_J_Consult_Clin_Psychol_74_307-316

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2606604/>

<https://pubmed.ncbi.nlm.nih.gov/17222282/>

<https://link.springer.com/article/10.1007/s40614-019-00216-z>

[https://psycnet.apa.org/record/2017-27173-001cell.com/neuron/fulltext/S0896-6273\(17\)30866-8?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0896627317308668%3Fshowall%3Dtrue](https://psycnet.apa.org/record/2017-27173-001cell.com/neuron/fulltext/S0896-6273(17)30866-8?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0896627317308668%3Fshowall%3Dtrue)

The following information was submitted by John R. Valencia on behalf of Pear Therapeutics, Inc, in February 2021.

Davis, D. R., Kurti, A. N., Skelly, J. M., Redner, R., White, T. J., & Higgins, S. T. (2016). A review of the literature on contingency management in the treatment of substance use disorders, 2009-2014. *Preventive Medicine*, 92, 36-46. doi:10.1016/j.ypmed.2016.08.008

Higgins, S. T., Silverman, K., & Heil, S. (2008). Contingency Management in Substance Abuse Treatment. *Drug and Alcohol Review*, 27(5), 572-573. doi: 10.1080/09595230802089933

Dutra, L., Stathopoulou, G., Basden, S. L., Leyro, T. M., Powers, M. B., & Otto, M. W. (2008). A meta-analytic review of psychosocial interventions for substance use disorders. *American Journal of Psychiatry*, 165(2), 179-187. doi:10.1176/appi.ajp.2007.06111851

Lussier JP, Heil SH, Mongeon JA, Badger GJ, Higgins ST. A meta-analysis of voucher-based reinforcement therapy for substance use disorders. *Addiction*. 2006

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Kurti, A. N., Davis, D., Redner, R., Jarvis, B., Zvorsky, I., Keith, D. R., ... Higgins, S. T.

(2016). A review of the literature on remote monitoring technology in incentive-based interventions for health-related behavior change. *Translational Issues in Psychological Science*, 2(2), 128-152. doi:10.1037/tps0000067

Kurti, A. N., & Dallery, J. (2013). Internet-based contingency management increases walking in sedentary adults. *Journal of Applied Behavior Analysis*, 46(3), 568-581. doi:10.1002/jaba.58

Maricich et al. (2020) *Curr. Med. Res. Opin.*, DOI: 10.1080/03007995.2020.1846023;

Velez et al. (2020) *Expert Rev. Pharmacoeconomics Outcomes Res.*, DOI:10.1080/14737167.2021.1840357

Trends in the Use of Methadone, Buprenorphine, and Extended-Release Naltrexone at Substance Abuse Treatment Facilities: 2003-2015 (Update). <https://www.samhsa.gov/data/sites/default/files/report3192/ShortReport-3192.html> Last accessed on 2/22/2021

Maricich YM et al. Safety and efficacy of a prescription digital therapeutic as an adjunct to buprenorphine for treatment of opioid use disorder. *Curr Med Res. Opinion*. 2020. DOI: <https://doi.org/10.1080/03007995.2020.1846022>

Substance Abuse and Mental Health Services Administration (SAMHSA): Treatment of Stimulant Use Disorders. SAMHSA Publication No. PEP20-06-01-001 Rockville, MD: National Mental Health and Substance Use Policy Laboratory. Substance Abuse and Mental Health Services Administration, 2020

Submitted information is available upon request. For information on the processes for submitting information to CHBRP for review and consideration please visit: www.chbrp.org/requests.html

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A group of faculty, researchers, and staff complete the analysis that informs California Health Benefits Review Program (CHBRP) reports. The CHBRP **Faculty Task Force** comprises rotating senior faculty from University of California (UC) campuses. In addition to these representatives, there are other ongoing researchers and analysts who are **Task Force Contributors** to CHBRP from UC that conduct much of the analysis. The **CHBRP staff** coordinates the efforts of the Faculty Task Force, works with Task Force members in preparing parts of the analysis, and manages all external communications, including those with the California Legislature. As required by CHBRP's authorizing legislation, UC contracts with a certified actuary, **Milliman**, to assist in assessing the financial impact of each legislative proposal mandating or repealing a health insurance benefit.

The **National Advisory Council** provides expert reviews of draft analyses and offers general guidance on the program to CHBRP staff and the Faculty Task Force. CHBRP is grateful for the valuable assistance of its National Advisory Council. CHBRP assumes full responsibility for the report and the accuracy of its contents.

Faculty Task Force

Timothy T. Brown, PhD, University of California, Berkeley

Janet Coffman, MA, MPP, PhD, Vice Chair for Medical Effectiveness, University of California, San Francisco

Sylvia Guendelman, PhD, LCSW, University of California, Berkeley

Gerald Kominski, PhD, University of California, Los Angeles

Sara McMenamin, PhD, *Vice Chair for Medical Effectiveness and Public Health*, University of California, San Diego

Joy Melnikow, MD, MPH, *Vice Chair for Public Health*, University of California, Davis

Jack Needleman, PhD, University of California, Los Angeles

Nadereh Pourat, PhD, *Vice Chair for Cost*, University of California, Los Angeles

Marilyn Stebbins, PharmD, University of California, San Francisco

Task Force Contributors

Danielle Casteel, MA, University of California, San Diego

Shana Charles, PhD, MPP, University of California, Los Angeles, and California State University, Fullerton

Margaret Fix, MPH, University of California, San Francisco

Naomi Hillery, MPH, University of California, San Diego

Jeffrey Hoch, PhD, University of California, Davis

Julia Huerta, MPH, University of California, Davis

Michelle Keller, PhD, MPH, University of California, Los Angeles

Connie Kwong, University of California, San Francisco

Elizabeth Magnan, MD, PhD, University of California, Davis

Jacqueline Miller, University of California, San Francisco

Marykate Miller, MS, University of California, Davis

Dominique Ritley, MPH, University of California, Davis

Dylan Roby, PhD, University of California, Los Angeles, and University of Maryland, College Park

Emily Shen, University of California, San Francisco

Riti Shimkhada, PhD, University of California, Los Angeles

Meghan Soulsby Weyrich, MPH, University of California, Davis

Steven Tally, PhD, University of California, San Diego

Sara Yoeun, MPH, University of California, San Diego

National Advisory Council

Lauren LeRoy, PhD, Strategic Advisor, L. LeRoy Strategies, Chair
Stuart H. Altman, PhD, Professor of National Health Policy, Brandeis University, Waltham, MA
Deborah Chollet, PhD, Senior Fellow, Mathematica Policy Research, Washington, DC
Allen D. Feezor, Former Deputy Secretary for Health Services, North Carolina Department of Health and Human Services, Raleigh, NC
Charles “Chip” Kahn, MPH, President and CEO, Federation of American Hospitals, Washington, DC
Jeffrey Lerner, PhD, President Emeritus, ECRI Institute Headquarters, Plymouth Meeting, PA; Adjunct Senior Fellow, Leonard Davis Institute of Health Economics, University of Pennsylvania
Donald E. Metz, Executive Editor, *Health Affairs*, Bethesda, MD
Dolores Mitchell, (Retired) Executive Director, Group Insurance Commission, Boston, MA
Marilyn Moon, PhD, Senior Fellow, Retired, American Institutes for Research, Washington, DC
Carolyn Pare, (Retired) President and CEO, Minnesota Health Action Group, Bloomington, MN
Richard Roberts, MD, JD, Professor Emeritus of Family Medicine, University of Wisconsin-Madison, Madison, WI
Alan Weil, JD, MPP, Editor-in-Chief, *Health Affairs*, Bethesda, MD

CHBRP Staff

Garen Corbett, MS, Director
John Lewis, MPA, Associate Director
Adara Citron, MPH, Principal Policy Analyst
Karen Shore, PhD, Contractor*
An-Chi Tsou, PhD, Contractor*

<p>California Health Benefits Review Program MC 3116 Berkeley, CA 94720-3116 info@chbrp.org (510) 664-5306</p>

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CHBRP assumes full responsibility for the report and the accuracy of its contents. All CHBRP bill analyses and other publications are available at www.chbrp.org.

Garen Corbett, MS
Director

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