

# Meeting 2 Issue Brief

## Overview of Interventions & Considerations for Addressing Methamphetamine Use

### Introduction

There are a variety of reasons an individual may use methamphetamine such as wanting increased energy and wakefulness, focus and attention, confidence, and weight loss. However, the increase in long-term and intense methamphetamine use is a growing concern because of its harmful effects on the individual and society. In 2009, methamphetamine use in the U.S. cost approximately \$23.4 billion, which included the costs associated with drug treatment, other drug use-related health costs, premature death, lost productivity, crime and criminal justice costs, child endangerment, and harms resulting from production of the substance.<sup>1,2</sup>

In San Francisco, over 90 people died of a methamphetamine overdose in 2017, and nearly half (47%) of all psychiatric emergency visits are related to methamphetamine use.<sup>3,4</sup> People in treatment for methamphetamine/amphetamine use are more likely to be in long-term rehabilitation/residential treatment compared to all other drug treatment admissions combined.<sup>5</sup> The considerable resources devoted to responding to and treating problematic methamphetamine use underscores the need for more effective, accessible, and cost-effective treatments.

### Effects of Long-Term & Intense Methamphetamine Use

Problematic substance use occurs when it increases a person's risk for health consequences (hazardous use) or has already led to health consequences (harmful use).<sup>6</sup> A substance use disorder (SUD) may be diagnosed when use leads to clinically significant distress and impairment in four broad areas: unhealthy use, social problems, loss of control, and pharmacological symptoms (e.g., tolerance

and withdrawal). SUD severity can be mild, moderate, or severe, with many persons with moderate to severe SUD suffering from the disease of addiction.<sup>7</sup>

Methamphetamine use disorder is a complex psychiatric condition characterized by a set of maladaptive behaviors which impairs an individual's ability to carry out daily life activities.<sup>8</sup> The DSM-5 criteria include maladaptive behaviors such as "continued use despite persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of methamphetamine", the development of "tolerance" and "withdrawal," and "persistent desire or unsuccessful efforts to stop or cut down or control methamphetamine use."<sup>9</sup>

There are numerous harmful effects of methamphetamine use, and long-term use of the drug can cause significant damage to the individual's brain, heart, lungs, and other organ systems. Both long-term and intense methamphetamine use has been associated with a wide range of mental decline, including difficulty processing information, memory, ability to respond, decision-making, problem solving, attention, and language.<sup>10</sup> When an individual stops using the substance, anxiety and depression may follow and last for many months thereafter. Research indicates that intense methamphetamine use is associated with higher levels of depressive symptoms.<sup>11</sup>

Clinical symptoms of methamphetamine-induced psychosis include extreme paranoia, delusions, and hallucinations.<sup>12,13</sup> However, psychiatric symptoms may vary as a result of individual differences in sensitivity to methamphetamine, the amount and/or frequency of use, and how it is consumed. For example, smoking and injecting methamphetamine result in the individuals feeling the drug's effects sooner, and they have the most potential for an overdose due to rapid increases in use. Individuals who inject and who have a family history of

<sup>1</sup> Nicosia, N. et al (2009). The Economic Cost of Methamphetamine Use in the United States, 2005. Retrieved from <https://www.rand.org/pubs/monographs/MG829.html>

<sup>2</sup> Brecht, M, Greenwell, L, & Anglin, MD. (2005) Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992–2002). *Journal of Substance Abuse Treatment*, 29: 295-306.

<sup>3</sup> Coffin, P.O. & Rowe, C. (2018). NDEWS San Francisco Sentinel Community Site (SCS) Drug Use Patterns and Trends, 2018. National Drug Early Warning System.

<sup>4</sup> San Francisco Department of Public Health (2018). CCMS Cohort Report, FY1718 Utilization. Whole Person Care.

<sup>5</sup> Courtney, K.E. & Ray, L.A. (2014). Methamphetamine: An update on epidemiology, pharmacology, clinical phenomenology, and treatment literature. *Drug and Alcohol Dependence*, 143: 11-21.

<sup>6</sup> American Society of Addiction Medicine (2013). Terminology Related to the Spectrum of Unhealthy Substance Use. Retrieved from <https://www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/public-policy-statements/2014/08/01/terminology-related-to-the-spectrum-of-unhealthy-substance-use>

<sup>7</sup> Hasin, D.S. et al. (2013). DSM-5 Criteria for Substance Use Disorders: Recommendations and Rationale. *American Journal of Psychiatry*, 170(8), 834-

851. Retrieved from <http://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2013.12060782>

<sup>8</sup> American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.)

<sup>9</sup> *ibid*

<sup>10</sup> Courtney, K.E. & Ray, L.A. (2014). Methamphetamine: An update on epidemiology, pharmacology, clinical phenomenology, and treatment literature. *Drug and Alcohol Dependence*, 143: 11-21

<sup>11</sup> Hillhouse, MP, Marinelli-Casey, Hillhouse, M, Ang, A, Mooney, LJ et al (2009). Depression Among Methamphetamine Users: Association With Outcomes From the Methamphetamine Treatment Project at 3-Year Follow-Up. *The Journal of Nervous and Mental Disease*, 197(4) 225-231.

<sup>12</sup> Rawson, RA (2013). Current research on the epidemiology, medical and psychiatric effects, and treatment of methamphetamine use. *Journal of Food and Drug Analysis*, 21:S77-S81.

<sup>13</sup> Hillhouse, MP, Marinelli-Casey, P, Gonzales, R, Ang, Alfonso, Rawson, RA et al (2007). Predicting in-treatment performance and post-treatment outcomes in methamphetamine users. *Addiction*, 102:84-95.

psychotic symptoms are at an elevated risk for the development of symptoms which can mimic schizophrenia.<sup>14</sup>

Methamphetamine-associated behaviors such as increased sexuality and injection drug use by some can increase the risk of contracting HIV, hepatitis, and other sexually transmitted infections. For example, among San Franciscans with syphilis, over half (56%) of men who have sex with women (MSW) and 35 percent of women reported methamphetamine use.<sup>15</sup> Use during pregnancy can result in preterm labor, fetal distress, fetal/ infant death, and infant growth restriction.<sup>16</sup>

## Potential Drivers of Problematic Use

### *History of Violence or Abuse*

Methamphetamine is often associated with violence, and people with problematic methamphetamine use may have histories marked by violence and abuse as children and adults. Multiple studies estimate that at least 60 percent of women who use substances have a history of being sexually abused. Additionally, interpersonal violence is characteristic of the lifestyles of the majority of persons entering treatment for methamphetamine use disorder.<sup>17</sup> Individuals experiencing both past and current abuse and violence tend to face an increased risk for a variety of psychological problems, including poor self-esteem, depression and anxiety disorders, post-traumatic stress disorders, substance abuse, suicide attempts, eating disorders, and interpersonal and sexual relationship problems.<sup>18</sup> Altogether, research suggests that integrated treatment approaches designed to address victimization, PTSD, and/or substance use disorders may be needed for a significant proportion of the methamphetamine treatment population, especially women.

### *Craving & Binging*

Frequent use of methamphetamine results in significant withdrawal symptoms such as depression, irritability, anxiety, aggression, inability to feel pleasure, excessive tiredness, and intense cravings for methamphetamine.<sup>19</sup>

Methamphetamine craving has been observed to be present for at least five weeks into abstinence, and the individual becomes particularly vulnerable to relapse for up to two weeks after discontinuing use – a significant predictor of subsequent use during outpatient treatment.<sup>20</sup> People who use methamphetamine develop a tolerance to the substance, and chronic use may lead to consuming it every few hours in “binging” episodes.<sup>21</sup>

### *Stigma*

People who use methamphetamine are likely to experience high levels of stigma and rejection in their personal and social lives from the public, health care professionals, and even individuals who practice non-injecting methamphetamine use.<sup>22</sup> Additionally, they often have multiple stigmatizing characteristics (e.g., HIV, MSM, mental illness, felony convictions) placing them at higher risk for experiencing stigma and its health consequences.<sup>23</sup> Studies indicate that illicit drug use is more stigmatized than mental illnesses such as depression and schizophrenia, perhaps because people who use drugs are perceived as having control over their use, and are thus more likely to be blamed for their substance use disorder.<sup>24</sup> These associations and attitudes are often reinforced by language and media portrayals depicting individuals who use alongside images of immorality, having chaotic lives, and perpetual use.<sup>25,26</sup> Higher levels of stigma are associated with chronic methamphetamine exposure, abuse of multiple substances, methamphetamine-induced psychosis, riskier practices such as injecting drugs and sharing syringes, and reduced use of services.<sup>27</sup>

## Treatment Barriers & Considerations

From 2013 to 2017, admissions to SUD treatment programs in San Francisco have increased 30 percent to 1,836 where methamphetamine is the primary substance. Over the same time period, admissions for other primary substances including alcohol, heroin, and cocaine/crack,

<sup>14</sup> *ibid*

<sup>15</sup> San Francisco Department of Public Health (2019). Recent Syphilis Trends in California and San Francisco.

<sup>16</sup> Brecht, M, Greenwell, L, & Anglin, MD. (2005) Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992–2002). *Journal of Substance Abuse Treatment*, 29: 295-306.

<sup>17</sup> Cohen, JB, Dickow, A, Horner, K, Zweben, JE, Balabis, J et al (2003). Abuse and Violence History of the Men and Women in Treatment for Methamphetamine Dependence. *The American Journal on Addictions*, 12:377-385

<sup>18</sup> *ibid*

<sup>19</sup> Courtney, K.E. & Ray, L.A. (2014). Methamphetamine: An update on epidemiology, pharmacology, clinical phenomenology, and treatment literature. *Drug and Alcohol Dependence*, 143: 11-21

<sup>20</sup> Galloway, G.P. & Singleton, E.G.. (2009). How long does craving predict use of methamphetamine? Assessment of use one to seven weeks after the assessment of craving: Craving and ongoing methamphetamine use. *Subst Abuse*. 1. 63-79.

<sup>21</sup> Quinn, B., Stooze, M, Papanastasiou, C, & Dietze, P (2013). An exploration of self-perceived non-problematic use as a barrier to professional support for methamphetamine users. *International Journal of Drug Policy*, 24:619-623.

<sup>22</sup> Semple SJ, Grant I, Patterson TL. Utilization of drug treatment programs by methamphetamine users: the role of social stigma. *Am J Addict*. 2005;14(4):367–380.

<sup>23</sup> Semple, SJ, Strathdee, SA, Zians, J, & Patterson, TL (2012). Factors associated with experiences of stigma in a sample of HIV-positive, methamphetamine-using men who have sex with men. *Drug and Alcohol Dependence*, 125(1-2) 154-159.

<sup>24</sup> Corrigan, Patrick & Larson, Jonathon & Rüsçh, Nicolas. (2009). Self-stigma and the “why try” effect: Impact on life goals and evidence-based practices. *World psychiatry: official journal of the World Psychiatric Association (WPA)*. 8. 75-81.

<sup>25</sup> Schwartz, J & Andsager, JL (2008). Sexual Health and Stigma in Urban Newspaper Coverage of Methamphetamine. *American Journal of Men’s Health*, 2(1) 57-67.

<sup>26</sup> Ahern, J., Stuber, J., & Galea, Sandro. (2007). Stigma, discrimination and the health of illicit drug users. *Drug and Alcohol Dependence*, 88(2), 188-196. *Drug and alcohol dependence*. 88. 188-96.

<sup>27</sup> Semple, SJ, Strathdee, SA, Zians, J, & Patterson, TL (2012). Factors associated with experiences of stigma in a sample of HIV-positive, methamphetamine-using men who have sex with men. *Drug and Alcohol Dependence*, 125(1-2) 154-159.

have either leveled off or decreased.<sup>28</sup> Consuming multiple substances is common among people who use methamphetamine, and half (50.1%) of treatment program admissions in 2017 involved methamphetamine as a secondary substance – most often with heroin (21.7%) and prescription opioids (9.8%).<sup>29</sup> The growing number of individuals using methamphetamine in treatment programs suggests that providers need to be aware of the factors associated with treatment engagement, retention, abstinence, completion, and post-treatment outcomes. Early identification of problematic methamphetamine use and effective treatment implementation is critical to successful outcomes. Moreover, successful treatment participation is influenced by many factors.

A system of care must consider a number of factors that may pose a barrier to effective treatment. For example:

- People who use methamphetamine face stigma and often choose not to seek city services based on previous experiences with providers resulting in feelings of disrespect, rejection, and distrust.
- Prolonged and intensive use of methamphetamine often results in violent and/or criminal behaviors that prevent the individual from being accepted for services. Individuals who use methamphetamine and are accepted into services may experience difficulty adhering to treatment, including filling their prescriptions.
- Program staff are often not trained to care for people with challenging behaviors and dispositions often expressed when people are under the influence of methamphetamine.
- Gaps throughout the city's system of services create challenges for people who use methamphetamine to consistently receive appropriate services at the appropriate time. People under the influence of methamphetamine present complex behaviors and needs, and more flexible approaches are needed that do not yet exist.
- Medi-Cal may not pay for some types of low-threshold services and may limit the number of treatment visits. The cost of treatment is too expensive for many to pay out of pocket.

### **People Experiencing Housing Instability**

In FY1718, 1,454 (10.6%) individuals in San Francisco experiencing housing stability were identified as using

methamphetamine.<sup>30</sup> Individuals without stable housing encounter a wide range of challenges in engaging and completing a treatment program. Treatment for methamphetamine use requires long-term practices and supports, and the lack of stable housing poses a regular threat, including the risk of losing necessary medications and belongings. Residential programs also do not exist for people who use stimulants. Moreover, because residential treatment is not housing, individuals may be reluctant to engage in this type service if they will become homeless after completing the program.

### **Youth**

The transition to methamphetamine use among youth is considered a particularly dangerous and growing problem. From 2015 to 2017, SUD treatment admissions for methamphetamine rose over 54 percent (7.9% to 12.2%) in San Francisco for those aged 25 years or younger.<sup>31,32</sup> Research suggests that, particularly among young, street-involved populations, methamphetamine use is associated with serious mental illness, malnutrition, incarceration, and numerous sex- and drug-related “risks behaviors” and negative health outcomes.<sup>33,34</sup> Youth's initiation often suggests a number of other factors that influenced their use such as experiencing abuse, disconnection from school, social exclusion, and negative experiences with health care professionals.<sup>35</sup> Even low-threshold treatment programs and mental health services can be perceived by youth to be a poor fit with their everyday lived experiences and priorities. Thus, interventions which address certain immediate needs, provide support to stabilize young people's lives, and address experiences of alienation are arguably as important as expanding treatment programs and mental health services available to local youth.

### **Women**

Women use methamphetamine at rates almost equal to men, and studies suggest that they are more likely than men to be attracted to the drug for weight loss and to control symptoms of depression. Over 70 percent of women with methamphetamine use disorder report histories of physical and sexual abuse, and they are also more likely than men to seek treatment while experiencing greater psychological distress.<sup>36,37</sup> In 2017, women accounted for over 1 in 4 (26.1%) of treatment admissions for methamphetamine in San Francisco.<sup>38</sup>

<sup>28</sup> Coffin, P.O. & Rowe, C. (2018). NDEWS San Francisco Sentinel Community Site (SCS) Drug Use Patterns and Trends, 2018. National Drug Early Warning System.

<sup>29</sup> *ibid*

<sup>30</sup> San Francisco Department of Public Health (2018). Whole Person Care Patient Data, FY17-18.

<sup>31</sup> Coffin, P.O. & Rowe, C. (2016). NDEWS San Francisco Sentinel Community Site (SCS) Drug Use Patterns and Trends, 2016. National Drug Early Warning System.

<sup>32</sup> Coffin, P.O. & Rowe, C. (2018). NDEWS San Francisco Sentinel Community Site (SCS) Drug Use Patterns and Trends, 2018. National Drug Early Warning System.

<sup>33</sup> Brecht, M, Lovinger, K, Herbeck, DM, & Urada, D. (2013). Patterns of treatment utilization and methamphetamine use during first 10 years after methamphetamine initiation. *Journal of Substance Abuse Treatment*, 44:548-556.

<sup>34</sup> Fast, D, Kerr, T, Wood, E, & Small, W (2014). The multiple truths about crystal meth among young people entrenched in an urban drug scene: A longitudinal ethnographic investigation. *Social Science & Medicine*, 110: 41-48.

<sup>35</sup> *ibid*

<sup>36</sup> Rawson, RA (2013). Current research on the epidemiology, medical and psychiatric effects, and treatment of methamphetamine use. *Journal of Food and Drug Analysis*, 21:S77-S81.

<sup>37</sup> Brecht, M, Lovinger, K, Herbeck, DM, & Urada, D. (2013). Patterns of treatment utilization and methamphetamine use during first 10 years after methamphetamine initiation. *Journal of Substance Abuse Treatment*, 44:548-556.

<sup>38</sup> Coffin, P.O. & Rowe, C. (2018). NDEWS San Francisco Sentinel Community Site (SCS) Drug Use Patterns and Trends, 2018. National Drug Early Warning System.

Women are statistically more likely to drop out of residential treatment before completion, but less likely to drop out of outpatient treatment. It is suggested that this illustrates reported difficulty for women to coordinate requirements of commonly available residential treatment with their child care responsibilities.<sup>39</sup>

### **Racial & Ethnic Minorities**

In 2017, racial and ethnic minorities accounted for nearly two-thirds (64.4%) of treatment admissions for methamphetamine in San Francisco – an increase from 49.4 percent since 2015.<sup>40,41</sup> The increasing ethnic diversity of the methamphetamine treatment population suggests an growing need for culturally and language-appropriate services and for greater understanding of any community-specific behaviors and context that might have treatment implications, including the location of services. For example, the city's pre-dominantly Black/African American neighborhoods are disproportionately affected by a lack of services; at the same time, the Black/African American also experiences over-representation in the criminal justice system.

### **Intervention Approaches**

There are a variety of factors that influence a person's journey along treatment and recovery from substance use, and it is important that a system of care incorporates low-threshold services to engage a person in a safe and respectful manner that builds trust and avoids stigmatization.

For example:

- a culture of hospitality
- welcoming spaces and flexible hours that offer support and community building opportunities
- drop-in groups and/or counseling operated by staff trained in trauma-informed care, motivational interviewing, de-escalation, and other relevant areas
- peer involvement
- outreach
- health fairs

### **Harm Reduction**

Harm reduction is a strategy that aims to reduce the harms associated with certain behaviors, such as drug use. While available treatments for methamphetamine

use only modestly effective, it is important to enhance the efficacy and quality of harm reduction services to reduce the adverse impacts of use, including:

- integrate harm reduction principles into treatment settings
- integrate evidence-based practices into treatment settings
- increase the accuracy, availability, and accessibility of up-to-date trainings and information for service providers
- challenge stigmatizing attitudes and beliefs about people who use drugs
- incorporate the perspective of people who use substances in developing strategies and resources.<sup>42</sup>

### **Behavioral Interventions**

Behavioral interventions, in the form of either outpatient or inpatient treatment programs, are the current standard of treatment for methamphetamine use. However, dropout rates in these programs can be as high as 75 percent.<sup>43</sup> Furthermore, studies show that while residential treatment significantly reduced methamphetamine use frequency at 3 months after treatment program completion, by 1 and 3 years post-treatment, the vast majority of people who received treatment reported similar methamphetamine use levels as would be expected had they not received treatment or had only received detoxification.<sup>44</sup>

- **Contingency Management**

Contingency management (CM) is a behavior modification intervention which reinforces desired behaviors through incentives and has been successful in treating people with methamphetamine addiction.<sup>45</sup> In successful CM-based treatment models, individuals would choose not to use methamphetamine when given a choice between methamphetamine and a monetary reinforcer, and the likelihood of using methamphetamine decreased as the monetary incentive amount increased.<sup>46</sup> The effectiveness of a purely behavioral intervention—such as CM alone—shows that financial rewards can compete with biological rewards influenced by cocaine and amphetamine. This seems to be true only if rewards are based upon the individual providing drug-free urine samples, as other types of rewards were not shown to be effective.<sup>27</sup>

<sup>39</sup> Brecht, M, Greenwell, L, & Anglin, MD. (2005) Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992–2002). *Journal of Substance Abuse Treatment*, 29: 295-306.

<sup>40</sup> Coffin, P.O. & Rowe, C. (2016). NDEWS San Francisco Sentinel Community Site (SCS) Drug Use Patterns and Trends, 2016. National Drug Early Warning System.

<sup>41</sup> Coffin, P.O. & Rowe, C. (2018). NDEWS San Francisco Sentinel Community Site (SCS) Drug Use Patterns and Trends, 2018. National Drug Early Warning System.

<sup>42</sup> Drug Policy Alliance. (2017). Stimulant Use: Harm Reduction, Treatment, and Future Directions.

<sup>43</sup> Colfax G, Shoptaw S. "The methamphetamine epidemic: Implications for HIV prevention and treatment." *Current HIV/AIDS Reports*. 2005;2(4):194–199.

<sup>44</sup> Mcketin, Rebecca & Najman, Jakob & Baker, Amanda & Lubman, Dan & Dawe, Sharon & Ali, Robert & Lee, Nicole & P Mattick, Richard & Mamun, Abdullah. (2012). Evaluating the impact of community-based treatment options on methamphetamine use: Findings from the Methamphetamine Treatment Evaluation Study (MATES). *Addiction*, 107:1998-2008

<sup>45</sup> Rawson, RA., McCann MJ., et al. (2006). A comparison of contingency management of cognitive-behavioral approaches for stimulant-dependent individuals. *Addiction*. 101, 267-274

<sup>46</sup> Roll, J. (2007). Contingency management in methamphetamine disorder treatments. *Addiction*. 102 (Suppl. 1), 114-120).

- **Cognitive Behavioral Therapy**

Cognitive behavioral therapy (CBT) is a form of psychotherapy, or counseling, that provides individuals with new skills (e.g. coping, stress management, cognitive restructuring) to reduce risk behaviors, such as drug use.<sup>47,35</sup> However, these treatments are time-intensive, expensive, and the outcomes are relatively poor at longer follow-up periods. At present, few effective options exist for individuals seeking treatment for methamphetamine use disorder, and to date these options have been limited to psychosocial interventions. There is modest evidence to suggest that other psychological interventions are effective for stimulant users.

### **Pharmacological Interventions**

There are currently no medications approved by the U.S. Food and Drug Administration (FDA) for use in treating methamphetamine use. Anti-depressants and anxiolytics may be used to improve depressive and anxiety symptoms with only limited benefits in reducing withdrawal symptoms. Neuroleptics may be used to treat methamphetamine-induced psychotic symptoms in the context of intoxication or recent use.<sup>48</sup> Research suggests potential benefits from mirtazapine, bupropion, methylphenidate, and oxytocin in reducing use.<sup>49,50</sup> Furthermore, there preliminary data suggest potential neuroprotection from agents such as n-acetylcysteine.<sup>51</sup> Results overall suggest that fully effective pharmacotherapy may require more than one agent.

### **Other Considerations**

- Research suggests that non-clinical providers may be more likely – and more confident – in discussing substance use with people who use methamphetamine rather than clinical providers who are tasked with providing medical services. Some providers acknowledge their need to learn how to be more culturally competent and sensitive when working with Black and Latino MSM who use methamphetamine in order to develop trust and not perpetuate stigma.<sup>52</sup>
- Providing education and sensitivity training to service providers and law enforcement partners may ensure that their actions and attitudes do not worsen experiences of stigma among the substance users they are intending to assist.

- Increased social support for people who use methamphetamine has shown positive effects on their mental health status, and it may lessen the negative social and emotional health consequences of stigma. Reducing levels of stigma among people who use methamphetamine might best be achieved using a multi-level approach that includes individual therapies to address drug cravings and negative emotions (e.g., Cognitive Behavioral Therapy, motivational interviewing), structural interventions (e.g., opioid substitution programs) to reduce injection drug use and promote safer injection practices, and community-based interventions to increase access to and availability of drug treatment programs.<sup>53</sup>
- There is growing evidence that reducing punishment – such as incarceration – and adopting positive reinforcement for people with substance use improves their access to services, reintegration into society, and public safety.<sup>54</sup>

### **Conclusion**

The rise in methamphetamine use and the associated adverse impacts on the individual and surrounding community underscore the need to investigate factors associated with successful methamphetamine treatment outcomes. There is a need to better understand treatment utilization and methamphetamine use patterns in order to optimize intervention efforts and minimize morbidity and social consequences of problematic methamphetamine use.

<sup>47</sup> Malgarejo, T. et al. (2018). A Blueprint Guide to Supporting Black and Latino MSM Who Use Crystal Meth. *Blueprint A Community Response to Crystal Meth*.

<sup>48</sup> Rawson, RA (2013). Current research on the epidemiology, medical and psychiatric effects, and treatment of methamphetamine use. *Journal of Food and Drug Analysis*, 21:S77-S81.

<sup>49</sup> Courtney, K.E. & Ray, L.A. (2014). Methamphetamine: An update on epidemiology, pharmacology, clinical phenomenology, and treatment literature. *Drug and Alcohol Dependence*, 143: 11-21

<sup>50</sup> Coffax, GN, Santos GM, Das M, Santos DM, Matheson T, Gasper J, Shoptaw S, Vittinghoff E.(2011). Mirtazapine to reduce methamphetamine use: a randomized controlled trial. *Archives of General Psychiatry*, 68(11) 1168-75.

<sup>51</sup> Bavarsad Shahripour, R., Harrigan, M. R., & Alexandrov, A. V. (2014). N-acetylcysteine (NAC) in neurological disorders: mechanisms of action and therapeutic opportunities. *Brain and Behavior*, 4(2), 108-22.

<sup>52</sup> Malgarejo, T. et al. (2018). A Blueprint Guide to Supporting Black and Latino MSM Who Use Crystal Meth. *Blueprint A Community Response to Crystal Meth*.

<sup>53</sup> Semple, SJ, Strathdee, SA, Zians, J, & Patterson, TL (2012). Factors associated with experiences of stigma in a sample of HIV-positive, methamphetamine-using men who have sex with men. *Drug and Alcohol Dependence*, 125(1-2) 154-159.

<sup>54</sup> De Crescenzo, F, Ciabattini, M, D'Alo, GL, De Giorgi, Giovane, CD et al (2018). Comparative efficacy and acceptability of psychosocial interventions for individuals with cocaine and amphetamine addiction: A systematic review and network meta-analysis. *PLoS Med* 15(12): e1002715. <https://doi.org/10.1371/journal.pmed.1002715>