# Predictors of Suicidal Ideation During Residential Substance Use Treatment

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## ABSTRACT

***Background:*** Individuals with substance use disorders (SUDs) and co-occurring chronic health and/or psychiatric conditions face unique challenges in treatment and may be at a greater risk for suicidal ideation relative to persons with SUD alone.

***Methods:*** In a sample of individuals entering residential SUD treatment in 2019 and 2020 (N = 10,242), we tested adjusted and unadjusted associations between suicidal ideation and (1) psychiatric symptoms and (2) chronic health conditions at treatment intake and during treatment using logistic and generalized logistic models.

***Results:*** Over a third of the sample endorsed suicidal ideation at intake, though the prevalence of suicidal ideation decreased during treatment. In both adjusted and unadjusted models, individuals who reported past-month self-harm, those who reported a lifetime suicide attempt, and individuals who screened positive for co-occurring anxiety, depression, and/or posttraumatic stress disorder were at elevated risk of endorsing suicidal ideation at intake and during treatment (*P* values < .001). In unadjusted models, chronic pain (odds ratio [OR] = 1.51, *P* < .001) and hepatitis C virus (OR = 1.65, *P* < .001) were associated with an elevated risk for suicidal ideation at intake, and chronic pain was associated with elevated risk for suicidal ideation during treatment (OR = 1.59, *P* < .001).

***Conclusions:*** Increasing accessibility to integrated treatments (ie, those that address psychiatric and chronic health conditions) for patients experiencing suicidal ideation may be beneficial in residential SUD treatment settings. Developing predictive models to identify those most at risk of suicidal ideation in real time remains a relevant direction for future work.


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Individuals with substance use disorders (SUDs) are at increased risk for suicidal ideation, suicide attempt, and death by suicide when compared to the general population.[1–3] Importantly, within the last two decades, there has been a sharp increase in the number of suicide, drug-related, and alcohol-related deaths.[4,5] These dual epidemics are not independent, with research showing that people with a SUD have a 2-fold greater risk of suicidal ideation relative to the general population[6] and a 1.5- to 12-fold increase in risk for death by suicide depending on the individual's primary substance.[7] Suicidal ideation often precipitates suicide attempts and suicide death[8,9] and requires urgent intervention to prevent serious harm or mortality. Given that nearly a third of patients at addiction treatment intake evidence suicidal ideation,[10] understanding factors associated with suicidal ideation in this population is critical to developing interventions aimed at curbing suicidal ideation and related negative sequalae.

Individuals with SUDs may be at risk for co-occurring psychiatric symptoms and chronic health conditions (eg, chronic pain, hepatitis C virus [HCV], HIV/AIDS) that may precede, correlate with, or be a consequence of substance use.[11,12] Research has shown that suicidal ideation is more prevalent in patients with psychiatric comorbidities (eg, anxiety, depression, and/or posttraumatic stress disorder [PTSD]) and among those engaged in suicide-related behaviors (eg, self-harm).[13–16] However, most of this work has been cross-sectional in nature or examined suicidal ideation at treatment intake or discharge. In one of the only longitudinal studies to examine associations between SUDs and suicidal ideation in addiction treatment–seeking populations,[17] greater past-month use of alcohol, cocaine, and polysubstance use was associated with greater suicidal ideation at treatment intake. Additionally, greater psychiatric symptom distress at intake was associated with greater suicidal ideation over time assessed at treatment intake, discharge from treatment, and 3- and 6-month follow-ups.[17]

Although a number of studies have examined associations of chronic health with suicidal ideation in population-based samples,[18–20] there is an absence of research that has examined associations of chronic pain and other chronic health conditions with suicidal ideation during substance use treatment and among those with a resolved substance use problem or disorder. There are many reasons to investigate these relations. For example, greater chronic pain severity was associated with suicidal ideation in a sample of veterans[21] and in those seeking treatment for chronic pain.[22] Meta-analyses similarly

**Clinical Points**

- Individuals with substance use disorders are at elevated risk for suicidal ideation; however, little is known about correlates of suicidal ideation during residential substance use treatment.
- Individuals presenting to residential substance use treatment with multiple risk factors for suicidal ideation (eg, past attempt, self-harm behavior, co-occurring psychiatric disorders) should be routinely assessed for suicidal thoughts and monitored closely.

have shown a higher lifetime incidence of suicidal ideation among individuals with HIV/AIDS relative to the general population.[23] Further, condition-specific characteristics (eg, fatigue) may be differentially associated with stress, stigma, functional disability, mental health impairments, and increased feelings of burden or shame,[8] all of which may exacerbate risk for suicidal ideation. Thus, different chronic health conditions may influence the presence of suicidal ideation among individuals in treatment for SUD.

Examining correlates of suicidal ideation in a residential substance use treatment setting may help inform care for individuals with substance use disorders. Residential substance use treatment is a highly structured form of care that is optimal for close monitoring and assessment and for provision of intensive interventions. However, there are some limitations to residential substance use treatment. For example, very few residential facilities have the resources to provide around-the-clock care to individuals with co-occurring physical health conditions, which may pose barriers for this population.[24] Better understanding correlates of suicidal ideation among individuals seeking residential substance use treatment may help improve treatment provision in residential substance use treatment settings. Indeed, elucidating factors that impact suicidal ideation endorsement at treatment intake and over the course of treatment has the potential to inform suicide screening efforts, optimize suicide prevention at a time of greater patient engagement, and ultimately improve quality of life among individuals in substance use treatment. Notably, data on physical and mental health–related factors are easily and often collected in routine care; identification of phenotypes related to increased risk of suicidality therefore has the potential to practically translate to a clinical care setting.

Using a large sample of individuals in residential SUD treatment, we examined whether (1) co-occurring chronic health conditions such as chronic pain, HCV, or HIV/AIDS and (2) co-occurring psychiatric conditions such as depressive symptoms, anxiety symptoms, PTSD symptoms, self-harm, and lifetime suicidal behavior were related to suicidal ideation in the month preceding intake and during treatment. We hypothesized that chronic pain, HCV, and HIV/AIDS would be associated with suicidal ideation in the month preceding and during the course of residential SUD treatment, as well as more stable suicidal ideation.

## METHODS

### Participants

Patients in residential substance use treatment (N = 10,242) were identified from a larger dataset of individuals who presented for admission to substance use treatment in the United States. We examined data in 2019 and 2020 and excluded data from earlier timepoints due to changes in how suicidal ideation was assessed prior to 2019 within this dataset. Data were collected by a third-party treatment outcomes data collection system (Vista Research Group Inc.) that partners with SUD treatment providers to track mental health symptoms and substance use behaviors. Here, we examined the subset of patients from this sample who were admitted to general residential treatment. Additional information about this dataset has been reported previously.[25,26] The study team received deidentified data via a data transfer agreement. The protocol was formally submitted to and acknowledged by the Johns Hopkins School of Medicine Institutional Review Board as not human subjects research due to the deidentified nature of the dataset.

### Measures

***Demographic and substance use characteristics.*** Participants reported their age, gender, race, marital status, employment status, and education level. Individuals were also asked to identify their primary substance leading into treatment. In this study, the following categories were considered: (1) alcohol, (2) cannabis, (3) opioids, (4) cocaine, (5) stimulants (ie, amphetamine, methamphetamine, prescription stimulants), or (6) other substances (ie, hallucinogens, club drugs, inhalants).

***Co-occurring physical and mental health conditions.*** Participants reported whether they currently had HCV and/or HIV/AIDS, two chronic health conditions that are more prevalent among individuals with SUDs than among the general population.[27] Participants were asked about whether they experienced chronic pain in the month before treatment ("During the month before you started treatment, did you suffer from chronic pain?"; response options included "No" and "Yes"). Participants were assessed for (1) depressive symptoms, (2) anxiety symptoms, and (3) PTSD. Clinically significant depressive symptoms (a score 10 or higher indicated a positive screen) were assessed using the Patient Health Questionnaire (PHQ-9).[28] Clinically significant anxiety symptoms (a score 10 or higher indicated a positive screen) were assessed using the Generalized Anxiety Disorder-7 (GAD-7).[29] Both variables were dichotomized in the analyses. Because individuals must endorse depressed mood or anhedonia to meet *DSM-5* criteria for major depressive disorder, and because excessive anxiety/worry and difficulties controlling worry are required for a *DSM-5* diagnosis of generalized anxiety disorder, participants were shown the full scale only if they endorsed one of the first two items of the PHQ-9 or GAD-7. Those who did not endorse either of those items were not shown the full scale and were

coded as having screened negative for depression and/or anxiety. With regard to PTSD, participants were asked two pre-screening questions about exposure and distress resulting from a traumatic event. Those who endorsed either item completed the Abbreviated Post-Traumatic Checklist, Civilian Version,[30] and those who scored 14 or higher were classified as having screened positive for clinically significant PTSD.

***Self-harm and past suicide attempt.*** Participants were asked whether they had harmed themselves on purpose ("During the month before you started treatment, did you ever harm yourself on purpose, such as by cutting yourself?"). Participants were also asked about past suicide attempts ("Have you ever done anything, started to do anything, or prepared to do anything to end your life?"). For each question, participants responded "Yes" or "No."

***Suicidal ideation.*** Participants completed two items, adapted from the Columbia Suicide Severity Rating Scale[31]: (1) wishing one was dead, or wishing one could go to sleep and not wake up; and (2) thoughts about killing oneself. Participants were asked to respond whether they experienced suicidal ideation a month prior to treatment intake (ie, "In the month before you started treatment, did you ever wish you were dead, or wish you could go to sleep and not wake up?"). Following intake, participants were asked to report on more proximal suicidal ideation (ie, in the last week or since the last time they completed a survey). Because of the difference in assessment periods for suicidal ideation, we examined suicidal ideation at intake in a separate model from suicidal ideation during treatment.

**Table 1. Demographic Characteristics[a]**

| Variable | Value |
|---|---|
| Gender | |
| Male | 6,578 (64.2) |
| Female | 3,664 (35.8) |
| Employment (% employed full or part time) | 6,532 (63.8) |
| Race | |
| White/Caucasian | 8,183 (79.9) |
| Black/African American | 670 (6.5) |
| Asian | 101 (1.0) |
| Native American | 147 (1.4) |
| Other/unknown | 1,141 (11.1) |
| Marital status | |
| Married | 2,859 (27.9) |
| Single, never married | 5,162 (50.4) |
| Single, previously married | 2,221 (21.7) |
| Education status | |
| Attended high school, did not graduate | 754 (7.4) |
| High school or GED[b] | 2,722 (26.6) |
| Attended college, but did not receive degree | 2,934 (28.6) |
| Associate's degree | 881 (8.6) |
| Bachelor's degree | 1,759 (17.2) |
| Masters or PhD degree | 611 (6.0) |
| Other | 581 (5.7) |
| Primary substance | |
| Alcohol | 4,989 (48.7) |
| Marijuana | 578 (5.6) |
| Opioids/heroin | 2,184 (21.3) |
| Cocaine | 750 (7.3) |
| Amphetamines, methamphetamines, or other stimulants | 962 (9.4) |
| Benzodiazepines | 365 (3.6) |
| Other substances | 414 (4.0) |
| Age, mean (SD), y | 36.99 (13.04) |

[a]Values are n (%) unless otherwise noted (percentages calculated from a total of 10,242 individuals).
Abbreviation: GED = General Education Development credential.

### Data Analysis

First, descriptive statistics and $\chi^2$ tests were used to contextualize the sample and describe relationships between chronic health conditions (chronic pain, HCV, HIV/AIDS) and other psychiatric comorbidities (ie, depression, anxiety, PTSD, self-harm behaviors). Logistic regression analyses (described in the next paragraph) were used to explore correlates of suicidal ideation in the month before treatment, assessed at intake. Generalized logistic models were used to test correlates of suicidal ideation during the first 4 weeks of residential treatment. A first-order autoregressive (AR1) covariance matrix was used. Week in treatment was included as a categorical fixed effect. All other independent variables of the mixed models, indicating endorsement of co-occurring symptoms at intake, were included as level-2 (time-invariant) fixed effects. A term for the random intercept was included in the model.

Models were evaluated iteratively. Unadjusted and adjusted models were run. For logistic regression models, we examined Nagelkerke $R^2$. Model sensitivity, specificity, correct classification, and $F$ score were examined for logistic regression and generalized logistic regression models. Finally, in separate models, we examined interactions between week in treatment and each co-occurring condition to explore whether individuals who screened positive for each condition at intake showed different endorsements of suicidal ideation over time. Of note, these interaction analyses were not run for HCV and HIV/AIDS due to low power. Data were analyzed in SPSS, version 27.

## RESULTS

### Sample Characteristics

A total of 10,242 individuals were identified as eligible for the present analysis at intake and were included in the intake regression. A total of 7,633 individuals had at least one in-treatment survey (following intake) and were included in the in-treatment model. Sample characteristics are presented in Table 1. Suicidal ideation within the past month was commonly reported at intake, with over a third of individuals reporting past month suicidal ideation (n = 3,578, 34.9%). Among individuals who reported any suicidal ideation, 42.8% reported death desire only, 5.3% reported thoughts of suicide only, and 51.8% reported both death desire and thoughts of suicide. However, suicidal ideation tended to be less common after intake, with 8.0% reporting suicidal ideation during the first week, 6.3% reporting suicidal ideation in the second week, 5.6% reporting suicidal ideation in the third week, and 4.9% reporting suicidal ideation in the fourth week of treatment. Approximately 14.4% of the sample (n = 1,470) reported a lifetime history of suicide attempt. Psychiatric comorbidity was also common at

**Table 2. Correlates of Suicidal Ideation at Intake[a]**

| | Unadjusted Odds Ratios | | Adjusted Odds Ratios | |
|---|---|---|---|---|
| Variable | OR (95% CI) | *P* Value | aOR (95% CI) | *P* Value |
| Demographics | | | | |
| Female gender[b] | 1.46 (1.34–1.59) | <.001* | 1.08 (0.98–1.19) | .134 |
| Age | 0.98 (0.98–0.98) | <.001* | 0.99 (0.99–0.997) | .001* |
| Primary substance[c] | | | | |
| Marijuana | 1.97 (1.65–2.34) | <.001* | 1.73 (1.40–2.15) | <.001* |
| Opioids/heroin | 1.38 (1.24–1.54) | <.001* | 1.27 (1.11–1.44) | <.001* |
| Cocaine | 1.59 (1.36–1.89) | <.001* | 1.48 (1.23–1.79) | <.001* |
| Other stimulants | 1.84 (1.60–2.12) | <.001* | 1.43(1.21–1.69) | <.001* |
| Benzodiazepines | 1.71 (1.37–2.12) | <.001* | 1.15 (0.90–1.49) | .266 |
| Other | 1.73 (1.41–2.13) | <.001* | 1.30 (1.02–1.66) | .036* |
| Chronic health | | | | |
| Chronic pain[d] | 1.51 (1.38–1.64) | <.001* | 1.09 (0.98–1.21) | .107 |
| Hepatitis C[d] | 1.65 (1.26–2.17) | <.001* | 1.18 (0.86–1.62) | .307 |
| HIV/AIDS[d] | 1.56 (0.96–2.53) | .074 | 1.09 (0.62–1.92) | .771 |
| Psychiatric comorbidity | | | | |
| Positive depression screen[e] | 6.98 (6.22–7.84) | <.001* | 3.65 (3.18–4.20) | <.001* |
| Positive anxiety screen[e] | 4.24 (3.85–4.68) | <.001* | 1.39 (1.22–1.58) | <.001* |
| Positive PTSD screen[e] | 4.69 (4.26–5.16) | <.001* | 2.00 (1.77–2.24) | <.001* |
| Past self-harm/suicidal behavior | | | | |
| Self-harm (past 30 days)[d] | 11.21 (8.78–14.30) | <.001* | 4.71 (3.58–6.20) | <.001* |
| Lifetime suicide attempt[d] | 8.19 (7.20–9.31) | <.001* | 5.03 (4.36–5.79) | <.001* |

[a]Nagelkerke $R^2 = 0.34$, correct classification = 0.72, sensitivity = 0.72, specificity = 0.71, *F* score = 0.64.
[b]Reference = not female.
[c]Reference = alcohol.
[d]Reference = did not endorse.
[e]Reference = screened negative.
*Statistically significant.
Abbreviations: aOR = adjusted odds ratio, OR = odds ratio, PTSD = posttraumatic stress disorder.

intake, with 66.4% (n = 6,799) screening positive for a major depressive episode, 62.3% (n = 6,384) screening positive for generalized anxiety, 58.4% (n = 5,979) screening positive for PTSD, and 4.9% (n = 503) reporting self-harm in the month before treatment. Approximately one-third of the sample (n = 3,169, 30.9%) reported experiencing chronic pain in the month before treatment. A smaller portion of the sample reported HCV (n = 216, 2.1%) and/or HIV/AIDS (n = 66, 0.6%).

Individuals with chronic pain were more likely to screen positive for psychiatric comorbidities. Specifically, patients who reported chronic pain at intake were more likely to report symptoms of depression (positive screen rates for depression were reported in 75.7% in individuals with chronic pain vs 62.2% in individuals without chronic pain; $\chi^2 = 177.36$, $P < .001$), anxiety (72.5% vs 57.8%; $\chi^2 = 200.17$, $P < .001$), PTSD (70.1% vs 53.1%; $\chi^2 = 258.87$, $P < .001$), self-harm (6.0% vs 4.4%; $\chi^2 = 12.24$, $P < .001$), and lifetime suicide attempt (18.9% vs 12.3%; $\chi^2 = 77.26$, $P < .001$). Similarly, relative to those without HCV, patients with HCV were more likely to screen positive for depression (75.5% vs 66.2%; $\chi^2 = 8.15$, $P = .004$), anxiety (74.1% vs 62.1%; $\chi^2 = 12.96$, $P < .001$), and PTSD (71.3% vs 58.1%; $\chi^2 = 15.16$, $P < .001$); were more likely to report self-harm (7.9% vs 4.8%; $\chi^2 = 4.14$, $P = .042$); and were more likely to report a lifetime suicide attempt (22.7% vs 14.2%; $\chi^2 = 12.46$, $P < .001$). Individuals who endorsed having HIV/AIDS were more likely to screen positive for anxiety (77.3% vs 62.2%; $\chi^2 = 6.32$, $P = .012$) and PTSD (77.3% vs 58.3%; $\chi^2 = 9.76$, $P = .002$), but were not more likely to screen positive for depression, report recent self-harm, or endorse a lifetime suicide attempt ($P > .175$).

### Suicidal Ideation at Intake

Correlates of suicidal ideation measured at intake are presented in Table 2. In unadjusted models, the following variables were associated with a greater likelihood of suicidal ideation at intake: (1) female gender, (2) younger age, (3) endorsing a primary substance other than alcohol, (4) reporting chronic pain, (5) reporting HCV, (6) screening positive for depression, (7) screening positive for anxiety, (8) screening positive for PTSD, (9) reporting self-harm in the past 30 days, and (10) reporting a lifetime suicide attempt.

In the adjusted model, younger age; endorsing marijuana, opioids/heroin, cocaine, other stimulants, or other substance (relative to alcohol) as one's primary substance; screening positive for depression; screening positive for anxiety; screening positive for PTSD; reporting self-harm in the past 30 days; and reporting a lifetime suicide attempt were each associated with higher likelihood of suicidal ideation at intake.

### Suicidal Ideation During Treatment

Correlates of suicidal ideation during treatment are presented in Table 3. Respondents had a lower likelihood of endorsing suicidal ideation during later weeks of treatment. In unadjusted models, being in an earlier week in treatment, female gender, younger age, reporting a primary substance other than alcohol, endorsing chronic pain at intake, screening positive for psychiatric conditions (ie, depression, anxiety, and/or PTSD), reporting self-harm in the past 30 days at intake, and reporting a lifetime suicide attempt at intake were each associated with higher likelihood of suicidal ideation during treatment.

**Table 3. Correlates of Suicidal Ideation During Treatment[a]**

| | Unadjusted Odds Ratios | | Adjusted Odds Ratios | |
|---|---|---|---|---|
| Variable | OR (95% CI) | *P* Value | aOR (95% CI) | *P* Value |
| Time | | | | |
| Week in treatment[b] | | | | |
| Week 2 | 0.38 (0.27–0.54) | <.001* | 0.36 (0.25–0.52) | <.001* |
| Week 3 | 0.23 (0.16–0.34) | <.001* | 0.22 (0.15–0.32) | <.001* |
| Week 4 | 0.13 (0.08–0.19) | <.001* | 0.12 (0.07–0.18) | <.001* |
| Demographics | | | | |
| Female gender[c] | 1.26 (1.01–1.56) | .041* | 0.84 (0.65–1.08) | .170 |
| Age | 0.97 (0.96–0.98) | <.001* | 0.99 (0.97–0.996) | .009* |
| Primary substance[d] | | | | |
| Marijuana | 2.70 (1.74–4.18) | <.001* | 1.95 (1.16–3.26) | .012* |
| Opioids/heroin | 1.43 (1.09–1.89) | .011* | 1.17 (0.83–1.64) | .367 |
| Cocaine | 1.72 (1.15–2.60) | .009* | 1.31 (0.82–2.10) | .263 |
| Other stimulants | 2.10 (1.45–3.05) | <.001* | 1.29 (0.83–2.00) | .261 |
| Benzodiazepines | 1.98 (1.17–3.36) | .011* | 1.06 (0.56–2.01) | .852 |
| Other | 3.16 (1.86–5.35) | <.001* | 1.90 (1.05–3.45) | .034* |
| Chronic health | | | | |
| Chronic pain[e] | 1.59 (1.27–1.99) | <.001* | 1.19 (0.92–1.55) | .193 |
| Hepatitis C[e] | 1.84 (0.90–3.80) | .097 | 1.16 (0.51–2.64) | .718 |
| HIV/AIDS[e] | 1.94 (0.56–6.66) | .295 | 1.41 (0.33–5.98) | .646 |
| Psychiatric comorbidity | | | | |
| Positive depression screen[f] | 7.68 (5.74–10.27) | <.001* | 3.22 (2.23–4.64) | <.001* |
| Positive anxiety screen[f] | 5.99 (4.65–7.72) | <.001* | 2.06 (1.48–2.86) | <.001* |
| Positive PTSD screen[f] | 5.16 (4.06–6.56) | <.001* | 1.79 (1.33–2.42) | <.001* |
| Past self-harm/suicidal behavior | | | | |
| Self-harm (past 30 days)[e] | 13.69 (8.76–21.39) | <.001* | 4.79 (2.88–7.96) | <.001* |
| Lifetime suicide attempt[e] | 10.01 (7.63–13.13) | <.001* | 5.69 (4.17–7.76) | <.001* |

[a]Correct classification = 0.97, sensitivity = 0.74, specificity = 0.99, *F* score = 0.98.
[b]Reference = week 1.
[c]Reference = not female.
[d]Reference = alcohol.
[e]Reference = did not endorse.
[f]Reference = screened negative.
*Statistically significant.
Abbreviations: aOR = adjusted odds ratio, OR = odds ratio, PTSD = posttraumatic stress disorder.

In the adjusted model, being in an earlier week of treatment, younger age, endorsing marijuana or other substances (ie, hallucinogens, club drugs, inhalants) as one's primary substance, screening positive for depression at intake, screening positive for anxiety at intake, screening positive for PTSD at intake, reporting self-harm in the past 30 days at intake, and reporting a lifetime suicide attempt at intake were associated with greater likelihood of suicidal ideation. Interactions between psychiatric comorbidities or chronic pain and week in treatment were not significant (*P* values > .194).

## DISCUSSION

The present analysis is one of few to explore the associations of psychiatric comorbidities, chronic health conditions, and suicidal ideation among a sample of patients in residential SUD treatment. Suicidal ideation was common in the current study, with more than a third of the sample reporting suicidal ideation at intake. The prevalence of suicidal ideation was lower during treatment than at treatment intake, but persisted among a subset of individuals, particularly those who reported psychiatric comorbidities, self-harm in the month before treatment, and a lifetime suicide attempt.

The finding that endorsement of suicidal ideation is less prevalent in the later parts of treatment has been reported in at least one other study.[17] There are several potential explanations for this finding. It may be that individuals who are retained in treatment experience an overall therapeutic benefit that reduces the incidence of suicidal ideation. It is also possible that residential treatment (and/or reductions in substance use resulting from limited access to substances in residential treatment) may have some therapeutic effect on suicidal ideation by fostering resilience and hope for the future. Increased social support and camaraderie (eg, through group therapy and psychosocial interventions) and the social environment of a residential setting may also attenuate thwarted belongingness and reduce risk for suicidal ideation.[32] However, alternative explanations (ie, that individuals stopped reporting suicidal ideation because they did not want to be retained in treatment) should also be examined in future studies.

These results underscore the importance of routine assessment of suicidal ideation during treatment, particularly among those presenting with other risk factors. Findings also illustrate that suicidal ideation during treatment can be predicted with a relatively high degree of accuracy when accounting for chronic health conditions, psychiatric comorbidities, week in treatment, and demographic characteristics. Further, results from the present study build upon a literature highlighting elevated risk of suicidality among individuals who use cannabis,[33–35] extending this finding to residential substance use treatment. Thus, it may

be beneficial for electronic medical record (EMR) systems to flag patients that present to treatment with these risk factors, so that clinicians can pay particularly close attention to individuals with the highest levels of risk.

Although suicidal ideation can occur in the absence of a plan or intent, in some patients, suicidal ideation occurred in the context of recent self-harm behaviors and among those with a history of suicide attempt. These patients may represent a particularly high-risk group, and they need adequate adjunctive care as well as clinical continuing care. For example, when possible, interventions specifically designed to reduce suicidal behavior, such as dialectical behavior therapy (DBT),[36] should be accessible in residential substance use treatment settings. Residential treatment providers should be vigilant in ensuring that patients have adequate aftercare. A root cause analysis of veterans who were recently discharged from substance use treatment found that over half of deaths by suicide following discharge occurred within 7 days of residential treatment and were often related to inadequate assessment of suicide risk and treatment discontinuation following residential care.[37]

The current analysis also emphasizes the need for integrated care in residential SUD treatment. In unadjusted analyses, both chronic pain and HCV were associated with increased odds of suicidal ideation in the month before treatment, and chronic pain was also associated with increased odds of suicidal ideation during treatment, though these associations became non-significant in adjusted models. Of note, however, all health conditions were associated with greater risk for psychiatric comorbidities that were strongly predictive of suicidal ideation at intake and during treatment. Because depression and anxiety symptoms are often not diagnosed and can go untreated among patients with chronic health comorbidities,[38] providers should be aware that individuals with chronic health comorbidities may be at an elevated risk for symptoms of depression, anxiety, PTSD, and self-harm—factors that in and of themselves may increase risk of suicidal ideation. Comorbidities should thus be considered in treatment planning. Mindfulness-oriented recovery enhancement has shown promise in treating co-occurring prescription opioid misuse and chronic pain[39] as well as co-occurring substance use and psychiatric conditions.[40] Further, previous work has found promising treatment engagement in an intervention that screened and treated individuals for HCV in a mental health/addiction service setting,[41] demonstrating feasibility in implementing treatments that address substance use, mental health, and chronic health conditions. Treatment providers should also ensure that individuals have access to ongoing mental health treatment as a part of their aftercare/discharge plan, if warranted.

The results should be considered in the context of certain limitations. Participants self-reported diagnoses of chronic health conditions, and we were not able to medically verify diagnoses due to the deidentified nature of the dataset, increasing the potential for false negatives or false positives. Further, fine-grained information about the nature and time of diagnoses was not available for chronic health conditions. Due to the deidentified nature of the data source, we did not have fine-grained information about the kinds of treatment provided to participants or the types of concurrent interventions that patients received. Results may not generalize to all individuals seeking substance use treatment, as the sample was not prospectively designed to be representative and is drawn from treatment centers that are using the Vista Research Group, Inc., platform to monitor patient symptoms during treatment. It is also possible that findings may or may not generalize to outpatient or IOP settings, and they should be replicated in future studies. While logistic regression analyses were able to classify patients with modest accuracy using information collected at treatment intake in the present analysis, future research may use machine learning approaches to further optimize models of risk for suicidal ideation in the context of residential substance use treatment. Though we were powered to detect small effects for most variables in our study, we had lower power for predictor variables with lower levels of endorsement (eg, HIV) and were additionally not able to explore interactive effects between week in treatment and HIV status. Finally, self-injury was assessed using a single item, increasing risk of false positives and false negatives. We do not have information about the motives for self-injury, something that should be explored in future work. Future work should also examine correlates of different types of suicidal ideation (ie, death desire vs thoughts of suicide) to better understand risk factors for each of these phenomena.

The present analyses are among the first to examine the prevalence of suicidal ideation in the month preceding treatment and during residential treatment. Results suggest that rates of suicidal ideation are relatively high, particularly among individuals with co-occurring psychiatric and chronic health conditions. Regular assessment of suicide risk, particularly among high-risk groups, and the consideration of chronic health and psychiatric comorbidities are essential in SUD treatment planning.



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