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How does active substance use at psychiatric admission impact suicide risk and hospital length of stay?

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Abstract

Background/Objective—Despite their high prevalence, little is known about the effects of substance use disorders (SUD) and active substance use on the suicide risk or length of stay (LOS) of psychiatric inpatients. This study examines the relationship between active substance use at the time of psychiatric hospitalization and changes in suicide risk measures and LOS.

Methods—Admission and discharge ratings on the Suicide Status Form-II-R, diagnoses, and toxicology data from 2333 unique psychiatric inpatients were examined. Data for patients using alcohol, THC, methamphetamines, cocaine, benzodiazepines, opiates, barbiturates, PCP and multiple substances on admission were compared with data from 1426 admissions without substance use.

Results—Patients with substance use by toxicology on admission had a 0.9 day shorter LOS compared to toxicology-negative patients. During initial nurse evaluation on the inpatient unit, these patients reported lower suicide measures (i.e. suicidal ideation frequency, overall suicide risk, and wish-to-die). No significant between-group differences were seen at discharge. Patients admitted with a SUD diagnosis had a 1.0 day shorter LOS than those without, while those with a SUD diagnosis and positive toxicology reported the lowest measures of suicidality on admission. These results remained independent of psychiatric diagnosis.

Discussion—For acute psychiatric inpatients, suicide risk is higher and LOS is longer in patients with SUDs who are NOT acutely intoxicated compared with patients without a SUD. Toxicology-positive patients are less suicidal on admission and improve faster than their toxicology-negative counterparts. This study gives support to the clinical observation that acutely intoxicated patients may stabilize quickly with regard to suicidal urges and need for inpatient care.

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Keywords

alcohol-use disorder; substance-use disorder; suicide; length of stay; acute intoxication; suicidality; inpatient psychiatric hospitalization

Introduction

Suicide is responsible for approximately 800,000 deaths worldwide annually and is the second leading cause of death among 15-29 year-olds.(1) In the United States, suicide accounted for over 41,000 deaths in 2013 and is the tenth leading cause of death overall.(2) In addition to the great mortality cost, suicidal patients place a substantial burden on the medical system, with an average of 420,000 annual emergency department visits for attempted suicide, and the average annual number of these visits doubling between 1993-1996 and 2005-2008.(3)

Psychiatric hospitalization is the standard of care for those at imminent risk for suicide. Despite acute treatment, there remains a particularly high risk of suicide for these patients immediately after discharge.(4, 5) Unfortunately, the duration of hospitalization needed to offset this increase in mortality is controversial, as increased suicide rates have been shown for both relatively short and long hospital treatment courses.(6-9) This is further complicated by the diagnosis of a substance use disorder (SUD), as these patients have the highest risk of suicide attempt post-discharge.(10)

Moreover, substance use disorders contribute negatively to hospital admissions and readmissions. Active alcohol intoxication at the time of hospitalization has been shown to predict increased rates of readmission(11), and intoxication has been shown to be associated with a shorter hospital length of stay, leading at least one group to postulate that acutely intoxicated emergency department patients may be better served in an acute diversion unit setting.(12) What is not yet understood is the relationship between suicide risk changes and active intoxication or substance use – data that would be important to understand before embarking on policy shifts toward diversion units.

Patients with an alcohol use disorder have a 4.8 to 6.5 times greater risk for a suicide attempt during their lifetime compared to those without a SUD, while those with a drug use disorder have a 5.8 times greater risk.(13) Previous studies have demonstrated that more than half of acute psychiatric admissions for suicidality involve either alcohol or drugs, and the lifetime risk of completed suicide for those with a SUD is 7%, higher than that of mood disorders (2.2-6%) and schizophrenia (5%).(14-18) Also, 31% of patients with cocaine-use disorders and 13-45% of methamphetamine dependent adults reported a lifetime history of suicide attempts.(19-21) It appears number of substances used is a better predictor of suicidality than what substances are used.(22, 23)

Substance use is related to suicide through multiple interactions. First, substance use disorders, particularly given high levels of psychiatric comorbidities, are associated with a chronic elevated risk of suicide, as described above. Second, acute intoxication increases impulsive behaviors, with an associated increase in suicide risk. (24)

This study attempts to clarify the acute effect of active substance use on suicidality and LOS of hospitalized psychiatric patients. We sought to examine the impact of active substance use (as determined by a positive urine toxicology screen for any substance) on hospital LOS and suicidality measures (including psychiatric pain, stress, agitation, hopelessness, self-hate, overall suicide risk, suicidal ideation frequency, wish-to-live and wish-to-die) during their time in treatment. We also examined the impact of a previous diagnosis of SUD on both measures of suicidality and LOS. Overall the study was designed to evaluate the suicide risk of hospitalized psychiatric patients with respect to substances of abuse.

Methods

Sample

This study was reviewed and approved by the Mayo Clinic Institutional Review Board. We identified 7698 unique psychiatric inpatients (readmissions excluded) who had a valid research authorization on file with Mayo Clinic Hospital and had been admitted between October 2008 and September 2013. From this sample, we next identified 2333 patients (30.3% of total psychiatric inpatients during this period) that were age 18-65 and had complete urine toxicology screening at admission (including alcohol, THC, methamphetamines, cocaine, benzodiazepines, opiates, barbiturates, and PCP), complete Suicide Status Form-II-R on admission and discharge, and complete data on personal and family history of suicide. This sample was divided into 1426 toxicology negative and 907 toxicology positive patients. Lastly, we subdivided both the toxicology negative and positive groups based on diagnosis, or lack thereof, of a substance use disorder (**Fig. 1**).

Assessment

The Suicide Status Form II, Revised (SSF-II-R) was used to measure several research-based factors contributing to acute suicidality: psychiatric pain, stress, agitation, hopelessness, and self-hate. The survey also assesses patient perceived overall suicide risk on a 1-5 scale, frequency of suicidal ideation on a 0-4 scale, and wish-to-live and wish-to-die on a 0-8 scale. (26)

Results of the SSF-II-R and other variables including reported family history of suicide, suicide attempt history, SUD diagnosis, LOS, and urine toxicology screen status on admission were obtained via electronic medical record. The demographic, historical and clinical data used in this study were collected from patients on admission via self-report questionnaires and clinical interview, with further psychiatric diagnoses obtained from billing records.(25)

Statistical Analyses

Toxicology negative and toxicology positive patients, as well as those with and without a previous SUD diagnosis, were compared with a two-sample t-test to determine differences between LOS and SSF-II-R measures. When comparing differences between individual drugs or when using both SUD diagnosis and active substance use status in variables, analyses of variance (ANOVA) was used.

In addition, we examined the relationship between substance use disorder diagnoses, active substance use at admission, and length of stay, controlling for psychiatric diagnosis. The primary diagnosis at discharge was grouped into one of eight categories: adjustment disorders (n=138), anxiety disorders (n=62), bipolar disorders (n=384), drug-induced mental disorders (n=115), drug- and alcohol-use disorders (n=60), other mental disorders (n=165), psychotic disorders (n=197), and unipolar depressive disorder (n=1212). The “Other Psychiatric Diagnosis” category included low numbers of various diagnoses, including eating disorders (n=5), intellectual disabilities (n=9), somatoform disorders (n=12), delirium/dementia (n=5), not-specified mood disorders (n=85), and other diagnoses not readily categorized into the groupings (n=49).

Results

Patients included in this study were predominantly Caucasian (88.5%) and female (55.9%), ranging in age from 18 to 65 (mean = 36.9, SD = 12.8). A total of 1528 (65.5%) had a previous diagnosis of a SUD. On admission, 907 (38.9%) had a positive toxicology screen. This population had a very slight female predominance (54.3%) and most of its members had been diagnosed with a SUD (81.6%). The most common drugs found on urine toxicology screen were benzodiazepines (16.5%), THC (15.6%), and EtOH (14.7%; **Table 1**).

Patients that tested positive for any substance on admission were hospitalized for 0.9 days less than those that did not. More specifically, patients that tested positive for EtOH and multiple substances on admission were hospitalized for 2.0 and 1.5 days less than toxicology negative patients, respectively. There was no significant difference in LOS of toxicology-negative patients and those who tested positive for the remaining substances (**Table 2**).

By several measures of the Suicide Status Form-II-R, including overall suicide risk, frequency of suicidal ideation and wish-to-die, acutely intoxicated patients were less suicidal on admission. By discharge, however, there was no difference from their toxicology-negative counterparts in any SSF-II-R measures. A similar pattern was seen with users of EtOH and multiple substances; they were less suicidal on admission by measures of psychological pain, stress, agitation, hopelessness, wish-to-live and wish-to-die, but showed no difference in these measures at discharge (**Table 2**).

A previous diagnosis of a SUD was associated with a shorter psychiatric hospital LOS. Patients with a diagnosis were hospitalized for 1.0 fewer days than those without ($p<000.1$). However, there was no difference in any of the SSF-II-R measures between those with a SUD diagnosis and those without. When these groups were subdivided by both toxicology status and SUD diagnosis, some significant differences emerged. Patients with both a positive toxicology screen and SUD diagnosis had the shortest LOS at 5.9 days, approximately 1.0 day less than any patient with a negative toxicology status, and 2.0 days less than a patient with a positive toxicology screen and no SUD diagnosis. However, there was no difference between patients in the other 3 groups (**Table 3**).

Overall, patients with a history of a SUD and a positive drug screen had the lowest SSF-II-R measures on admission, including frequency of suicidal ideation, wish-to-live and wish-to-die. These measures were significantly less than those of toxicology-negative patients with or without a history of a SUD. In addition, there was no significant difference between the toxicology negative subgroups. The group of patients with no SUD diagnosis and positive-toxicology did endorse greater psychological pain than those without a SUD diagnosis, which corresponded to a longer LOS (**Table 3**).

These differences remained even when we controlled for the LOS stay differences that could be attributed to the psychiatric diagnosis of the patient (**Table 4**). When controlling for this variable, those with a positive-toxicology had a LOS that was 0.5 days shorter than those with a negative screen. In addition, patients with a SUD diagnosis had a LOS that was 0.9 days shorter than those without.

Discussion

This study shows that patients with positive urine toxicology at the time of admission have a 0.9 day shorter LOS during acute psychiatric hospitalization than toxicology-negative patients. Even after controlling for psychiatric diagnosis, the LOS for those with a positive-toxicology was 0.5 days shorter than those with a negative toxicology screen. These patients were less suicidal on admission, as indicated by several measures of the SSF-II-R. During hospitalization, their ratings of suicidal risks improved to same degree as toxicology-negative patients, albeit in less time.

We also discovered that patients with a previous SUD diagnosis have a 1.0 day shorter LOS than those without a diagnosis. When controlling for psychiatric diagnosis, the LOS for those with a SUD diagnosis was 0.9 days shorter than those without a diagnosis. When further subdivided by both SUD diagnosis and toxicology status, several other findings emerged. Those with a SUD diagnosis and positive toxicology screen had the shortest LOS at 5.9 days, approximately 1 day shorter than any patient with a negative toxicology screen and 2 days shorter than an intoxicated patient with no SUD history. As with the LOS differences seen between toxicology-negative and -positive patients, these findings can also be explained by the differences in admission suicidality ratings. Patients with a positive toxicology and a previous SUD diagnosis were significantly less suicidal than any other group, and thus had a short LOS.

Taken together, these findings suggest that for acute psychiatric inpatients, suicide risk is higher and LOS is longer in patients with SUDs who have NOT taken substances (as measured by urine toxicology) compared with patients who have. Toxicology-positive patients are less suicidal on admission and improve faster than their toxicology-negative counterparts.

These findings support those of Ries *et al.* who identified a group of mostly nonpsychotic psychiatric inpatients with coexisting addiction disorders and suicidal ideation that is primarily substance-induced.(27) These patients have been previously described in a variety of other studies.(28, 29) Just as in our study, these patients showed more rapid improvement

in suicidality than those whose admission was not associated with active substance use. Depending on the degree that the psychiatric symptoms could be attributed to drug abuse, they had a LOS that was 1.2 to 3.4 days shorter than those without any drug abuse. Their study did not reveal any difference in the suicidal measures at admission, however, while we found that acutely intoxicated patients were less suicidal by several measures of the SSF-II-R.(27)

As the severity of substance disorder increases, from none, to abuse, to dependence, patients are more likely to be more suicidal.(30) Further, as the severity of substance dependence increases, patients are less likely to be civilly committed, more likely to be discharged against medical advice and have shorter LOS, yet have greater suicidal ideation on admission.(30) Our findings support these observations, as those with a SUD diagnosis and positive toxicology have the shortest length of stay.

While these findings do not necessarily diminish the acute need for psychiatric hospitalization, they should inform hospital goals. Reducing suicide risk in patients with substance use disorders involves substance use disorder treatment. In fact, in one study patients attempted suicide less than half as frequently in the year following substance use disorder treatment as in the year before.(31) In addition, the longer the treatment period, the lower the rate of suicide attempts in the following year.(31)

This study is, of course, limited by its reliance on positive toxicology markers as a method of identifying active substance use at the time of admission. This may not serve as a meaningful surrogate for the recent use or active intoxication with a substance. Furthermore, some people with positive toxicology screens could have been in withdrawal, which could further confound SSF responses at the time of admission. Nonetheless, in clinical practice these data often are part of the risk stratification used to inform hospitalization decisions, and the use of this test produced clinically meaningful results that extend prior findings from the literature.

Future research could include serial SSF-II-R forms for acutely intoxicated patients to determine when the greatest improvement of suicidality takes place. Is it in the first 24 hours, as would be expected if the suicidal urges are most attributable to active substance use? Or does improvement take place later, with the acute stabilization of the inpatient setting?

Conclusions

This study gives support to the clinical observation that patients who are actively using substances may stabilize quickly with regard to suicidal urges and need for inpatient care. Risk mitigation may be best achieved through substance use disorder treatment. Further research should evaluate the observation that emergency department patients with substance use disorders who are not currently intoxicated may be at higher risk of suicide.

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7698 Unique Psychiatric Inpatients Admitted Between 10/2008 – 09/2013

Figure 1.

Toxicology and substance use disorder (SUD) status for participating patients.

Table 1**Patient Demographics.**

	N	Men	Women	Caucasian	Average Age	SUD Diagnosis
Total Population	2333	1028 (44.1%)	1305 (55.9%)	2065 (88.5%)	36.9 ($\pm$ 12.8)	1528 (65.5%)
Toxicology Neg.	1426 (61.1%)	614 (43.1%)	812 (56.9%)	1252 (87.8%)	36.6 ($\pm$ 13.0)	788 (55.2%)
Toxicology Pos.	907 (38.9%)	414 (45.6%)	493 (54.3%)	813 (89.6%)	37.5 ($\pm$ 12.5)	740 (81.6%)
Ethanol Pos.	133 (14.7%)	59 (44.4%)	74 (55.6%)			123 (92.5%)
THC Pos.	142 (15.6%)	89 (62.7%)	53 (37.3%)			135 (95.1%)
Cocaine Pos.	21 (2.3%)	11 (52.4%)	10 (47.6%)			20 (95.2%)
Meth. Pos.	103 (11.4%)	48 (46.6%)	55 (53.4%)			74 (71.8%)
Mult. Sub. Pos.	251 (27.7%)	114 (45.4%)	137 (54.6%)			232 (92.4%)
Benz. Pos.	150 (16.5%)	57 (38.0%)	93 (62.0%)			84 (56.0%)
Opiate Pos.	88 (9.7%)	24 (27.3%)	64 (72.7%)			60 (68.2%)
Barb. Pos.	16 (1.8%)	11 (68.8%)	5 (31.2%)			10 (62.5%)
PCP Pos.	3 (0.3%)	1 (33.3%)	2 (66.6%)			2 (66.6%)

Table 2

The impact of acute intoxication on LOS and suicidality as measured by SSF-II.

Admission Status	N	Length of Stay (days)	Suicidal Ideation Frequency	Psychological Pain	Stress	Agitation	Hopelessness	Self-Hate	Overall Suicide Risk	Wish-to-Live	Wish-to-Die
Toxicology Neg.	1426	7.1	1.4	3.2	3.6	2.7	3.2	2.9	1.9	6.2	2.2
Toxicology Pos.	907	6.2 (p<0.0001)	1.3 (p=0.03)	3.3	3.6	2.7	3.1	2.8	1.8 (p=0.03)	6.4	2.0 (p=0.04)
Barb. Pos.		8.9	1.8	3.6	3.6	2.8	3.4	3.4	2.2	6.4	2.6
PCP Pos.		7.7	0.0	1.7	2.0 *	2.3	1.7	1.3	1.0	7.3	0.0
Meth. Pos.		7.4	1.2	3.6 *	3.8	3.0	3.4	2.9	1.7	6.2	2.0
BZD. Pos.		7.3	1.4	3.7 *	3.8	2.8	3.3	2.8	1.8	6.3	2.2
THC Pos.		6.3	1.3	3.2	3.5	2.8	3.0	2.8	1.7	6.3	2.2
Opiate Pos.		6.1	1.5	3.5	3.7	2.9	3.3	3.0	2.0	6.1	2.5
Cocaine Pos.		5.8	1.1	2.8	3.3	2.2	2.7	3.0	1.8	6.2	2.7
Mult. Sub. Pos.		5.6 *	1.2	3.2	3.6	2.6	2.9 *	2.7	1.8	6.6 *	1.8 *
EtOH Pos.		5.1 * (p<0.0001)	1.2	2.9 * (p<0.0001)	3.3 * (p=0.04)	2.4 * (p=0.004)	2.8 * (p=0.009)	2.8	1.7	6.4 (p=0.04)	1.7 * (p<0.02)

* sig. different from tox. negative patients by ANOVA

Table 3

The impact of acute intoxication and SUD diagnosis on LOS and suicidal ity as measured by SSF-II.

Admission Status	N	Length of Stay (days)	Suicidal Ideation Frequency	Psychological Pain	Stress	Agitation	Hopelessness	Self-Hate	Overall Suicide Risk	Wish-to-Live	Wish-to-Die
No SUD Diagnosis + Pos. Tox.	167	7.7	1.3	3.5 *	3.8	2.7	3.3	2.8	1.9	6.2	2.3
No SUD Diagnosis + Neg. Tox.	638	7.3	1.4	3.2	3.6	2.7	3.1	2.8	1.8	6.3	2.1
SUD Diagnosis + Neg. Tox.	788	7.0	1.4	3.3	3.6	2.8	3.2	3.0	1.9	6.2	2.3
SUD Diagnosis + Pos. Tox.	740	5.9 * (p<0.0001)	1.3 * (p=0.02)	3.3 (p=0.03)	3.6	2.7	3.0	2.8	1.8	6.4 * (p=0.03)	2.0 * (p=0.01)

* sig. different between groups by ANOVA

Table 4

Controlling for the impact of psychiatric diagnosis on LOS.

Admission Diagnosis	N	Length of Stay (days)
Psychotic Disorders	197	9.0
Bipolar Disorders	384	7.7
Drug-Induced Mental Disorders	115	6.8
Unipolar Depressive Disorders	1212	6.8
Drug Use Disorders	60	6.4
Other Mental Disorders	165	6.2
Anxiety Disorders	62	5.4
Adjustment Disorders	138	4.1 (p<0.0001)
Controlling for Diagnosis		
Toxicology Neg.	1426	6.8
Toxicology Pos.	907	6.3 (p=0.04)
SUD Diagnosis	1528	6.1
No SUD Diagnosis	895	7.0 (p=0.0002)