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Evaluation of a Novel Protocol for Assessment and Treatment of Alcohol Withdrawal Syndrome in Psychiatric Inpatients

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Abstract

Background and Objectives: Despite the high incidence of alcohol withdrawal syndrome (AWS) in psychiatric inpatients, standardized methods for assessing and treating AWS have been studied only once before in this population. We evaluated a novel AWS assessment and treatment protocol designed for psychiatric inpatients.

Methods: This retrospective cohort study evaluated outcomes before and after implementation of the protocol. We collected consecutive data on patients ($N = 138$) admitted to inpatient psychiatric units at a single center. Participants were patients admitted for nonsubstance-related psychiatric reasons, who were also at risk for developing AWS. Those who developed AWS were treated with either (a) treatment as usual (TAU) or (b) a novel standardized protocol. The primary outcome was duration of benzodiazepine treatment for symptoms of alcohol withdrawal. Secondary outcomes included cumulative benzodiazepine dose administered, treatment duration, and incidence of complications.

Results: Of 138 participants, 83 received TAU and 55 were assessed and treated with the novel protocol. Median duration of benzodiazepine treatment following protocol implementation was 19.7 hours (interquartile range [IQR], 0–46) prior to implementation (TAU) and 0 hours (IQR, 0–15) following protocol implementation (protocol group) ($P < .0001$). Median benzodiazepine dose (in diazepam equivalents) administered to participants was 30 mg (IQR, 0–65) for TAU and 5 mg (IQR, 0–30) for the protocol group ($P < .001$). Adverse events before and after implementation occurred in 4.8% and 0%, respectively ($P = .15$).

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Declaration of Interest

The authors report no relevant conflicts of interest. The authors alone are responsible for the content and writing of this paper.

Conclusion and Scientific Significance: This study provides preliminary evidence for the efficacy and safety of a novel standardized AWS protocol for psychiatric inpatients. This is the first known study assessing an AWS assessment and treatment protocol designed for psychiatric inpatients.

INTRODUCTION

Alcohol use disorders are highly comorbid with other psychiatric disorders, with lifetime co-occurrence rates of 16.5% to 46.2%.¹ Patients with these concurrent disorders are at risk for developing alcohol withdrawal syndrome (AWS) when admission to a locked inpatient psychiatric unit interrupts alcohol use. Although the majority of patients who experience AWS symptoms have a benign course, some patients may develop serious sequelae such as seizures and/or delirium tremens (DTs). In addition, thiamine deficiency is common in patients with alcohol use disorder, and can lead to the devastating consequences of Wernicke's Encephalopathy and Korsakoff's Dementia. However, early recognition and appropriate treatment of AWS, along with thiamine supplementation, can reduce the risk of developing such complications.^{1,2} Many institutions use standardized protocols to assess and treat patients admitted to acute care psychiatric wards for nonsubstance-related psychiatric problems who are at risk for developing AWS. While numerous studies have demonstrated the effectiveness of such AWS protocols in decreasing morbidity associated with AWS on medical and surgical wards,²⁻⁶ many of these exclude patients with psychiatric comorbidities, and there are no published studies, to our knowledge, investigating the efficacy of AWS evaluation and treatment methods exclusively for psychiatric inpatients. One study evaluating the effects of implementation of a symptom-triggered protocol included psychiatric inpatients in addition to medical patients.⁷ Another study evaluating the impact of gabapentin in conjunction with benzodiazepines for management of AWS was conducted using psychiatric inpatients undergoing symptom-triggered therapy, but did not evaluate the safety nor effectiveness of the symptom-triggered protocol.⁸

Moreover, methods developed for evaluating and treating medical and surgical patients may not be generalizable to the inpatient psychiatric population. For example, the current standard for symptom-triggered treatment of AWS is the Clinical Institute Withdrawal Assessment of Alcohol Scale, Revised (CIWA-Ar). However, patients being treated primarily for psychotic, mood, and/or anxiety disorders often exhibit symptoms such as hallucinations, delusions, and elevated levels of anxiety that confound the interpretation of the CIWA-Ar, and challenges in communication due to psychiatric illnesses can, in some cases, preclude the use of this scale. As a result, patients with psychiatric illness have been excluded from most studies on standardized symptom-triggered therapy.²⁻⁶

To more effectively manage AWS in these complex patients, we developed an assessment and treatment algorithm for AWS targeting the specific needs of psychiatric inpatients. We used the available evidence in the literature along with input from a multidisciplinary team to develop this treatment algorithm, distilled into a preprinted order set (PPO).[†] The protocol includes options for (a) a fixed dosing schedule for those at significant risk for severe AWS, (b) the CIWA-Ar, modified to allow the psychiatric nurses to hold benzodiazepine doses and notify the physician if scores are thought to be confounded by psychiatric comorbidity, (c)

and an alternative symptom-triggered assessment method based solely on objective measures, for those patients who do not need a fixed dosing schedule, but for whom the CIWA-Ar cannot be used.

The aim of this pilot study was to determine the safety and feasibility of implementing this novel protocol on several psychiatric inpatient units and to assess preliminary effects of implementation.

METHODS

Subject Selection

Patients were identified retrospectively from the date of protocol implementation and prospectively after implementation. Potential subjects were identified by¹ a retrospective chart review screening for all ICD-10 codes that involved alcohol abuse or alcohol dependence and⁹ a review of pharmacy records to identify patients treated with diazepam, given that diazepam is the most frequently used medication for AWS at our institution, and is rarely ordered for other indications. Patients who were prescribed other medications for AWS were identified through the screening for ICD-10 codes. We sampled the TAU group from 1 September 2010 until 1 September 2012. The protocol data collection timeframe was 1 December 2013 to 31 May 2015 (Fig. 1). The sampling timeframe of the protocol group started 12 months after implementation to avoid an overlap between the periods of staff training and data collection. We collected data over 24 months for the TAU phase, but the period of data collection for the protocol group was limited to 18 months due to resource and time limitations. The Capital Health Research Ethics Board in Halifax, Canada, approved this retrospective cohort study where it was conducted.

Our inclusion criteria required patients to be admitted to an acute care psychiatric unit, monitored or treated for AWS, as ordered by a physician. We excluded individuals with a true allergy to benzodiazepines. Patients who had multiple admissions within the defined study period were treated as distinct encounters.

Prior to protocol implementation, patients at risk for AWS were managed with treatment as usual (TAU), which typically constituted physicians writing orders to monitor for signs and symptoms of AWS and administer particular doses of benzodiazepines for these signs and symptoms. Some physicians used a CIWA-Ar-based PPO developed for medical and surgical patients at the institution. Physicians included orders for supplemental thiamine at their discretion. Following implementation, physicians had the option of using an AWS PPO designed specifically for psychiatric inpatients.

The primary outcome measure was duration of benzodiazepine treatment for AWS, defined as the difference in hours between the first and last doses of benzodiazepine for the treatment of AWS given in hospital. The secondary outcome measures included¹ cumulative benzodiazepine dose administered, defined as total milligrams of diazepam equivalents

[†]We have since edited the formatting of the PPO to allow for more ease of use, primarily by ensuring that all orders appear on the first page, and we have provided the edited version, currently in use at our institution, here (Fig. 2). Please write to the corresponding author if you would like a copy of the original PPO that was used during the study period.

received during admission and⁹ duration of AWS protocol administration, defined as time from initial AWS protocol orders to protocol discontinuation. We used the conversion of 1 mg of lorazepam to 5 mg of diazepam. We also collected data on safety outcomes, including the incidence of mild to severe benzodiazepine intoxication and the incidence of severe complications of AWS (defined as hallucinations, use of restraint/seclusion, admission to the intensive care unit, seizure, behavioral agitation requiring physical intervention, DTs, and death deemed as a result of AWS).

Statistical Analysis

We performed a calculation of statistical power a priori based on a minimally clinically significant finding of 24 hours difference in median duration of benzodiazepine use between both groups. A recent study has shown that institution of an AWS treatment protocol in medical inpatients led to a significant difference in treatment duration of approximately 30 hours.⁷ We believe that given the high variability of the population being studied, the standard deviation would be approximately 48 hours. Using these numbers, we estimated it was necessary to enroll 80 patients per group for the final analysis to detect a mean difference of 24 hours between the two groups using 80% power, and a two-sided significance level of .05.

Data were analyzed by an external statistician using both Excel and SPSS statistical software. Nonparametric tests were used due to the prediction that the duration of treatment for AWS would be highly variable and, as seen in other studies, not normally distributed. A Mann-Whitney *U* test was used to compare the median duration of benzodiazepine treatment, median duration of AWS protocol administration, and cumulative benzodiazepine dose. The proportions of patients experiencing severe complications of AWS or benzodiazepine intoxication were analyzed using a χ^2 test. Data were collected and analyzed using an intention to treat analysis.

RESULTS

Of 827 admissions reviewed, 138 cases satisfied the inclusion criteria. There were 83 in the preimplementation group and 55 in the postimplementation group. Baseline demographic factors (Table 1) were similar across the preimplementation and postimplementation groups, with the only significant difference between the groups being the prevalence of a diagnosis of an alcohol use disorder, which was significantly higher in the postimplementation group (85% vs 51%). There were no significant differences observed in the prevalence of any major psychiatric disorder or medical illness, including hepatic disease, across groups other than the incidence of patients with a history of a head injury (Table 1). There were two patients in each group who were treated only with lorazepam; 2.4% in the preimplementation group and 3.6% in the postimplementation group.

In the protocol group, prescribers used the novel AWS protocol for the vast majority (94.5%) of patients at risk for AWS. Of those, protocol C, which involves the use of a modified CIWA-Ar, was used in 61.5% of the patients. However, a significant proportion of the patients were monitored and treated with protocols A (7.7%) and B (30.8%).

In an intention-to-treat analysis, the median benzodiazepine treatment time was significantly lower in patients after the implementation of the protocol: 0 hours (interquartile range [IQR], 0-15) in the postimplementation group compared to 19.7 hours in the preimplementation group (IQR, 0-46) ($P < .0001$; Table 2). Further, the percentage of patients treated with benzodiazepines for longer than 24 hours was significantly lower in the postimplementation group (26%, compared with 45% in the preimplementation group; $P = .03$). The total duration of active orders for monitoring and treatment of AWS was also significantly reduced after implementation of the standardized protocol. The median time of active AWS-related orders was 34.2 hours (IQR, 24.0-58.0) following protocol implementation compared to 75.0 hours (IQR, 49.3-141.3) in the preimplementation group ($P < .001$).

The total cumulative dose of diazepam equivalents (mg) was also significantly lower in the postimplementation group compared with the preimplementation group, with the median doses being 5 mg (IQR, 0-30) vs 30 mg (IQR, 0-65), respectively ($P < .001$; Table 2). The percentage of patients that received any benzodiazepine was also significantly reduced after the implementation of the protocol (74% vs 51%; $P = .01$).

The occurrence of adverse events was 5% in the preimplementation group and 0% in the postimplementation group ($P = .15$). There was also a significant difference in the administration of parenteral thiamine after the implementation of the protocol, with 9% of the preimplementation group receiving thiamine compared with 44% in the postimplementation group ($P < .0001$).

DISCUSSION

To our knowledge, this is the first published study to investigate the safety and efficacy of implementing a standardized protocol to treat AWS on acute psychiatric inpatient units. We found that by using a standardized protocol specifically designed for this population, patients received significantly less diazepam equivalents and were treated with benzodiazepines for less time than patients who were not treated with this protocol. Although this study was originally designed to detect a difference between groups with 80 participants in each group we were able to detect a difference despite a lower sample size in our protocol group suggesting that our findings are more robust than what was originally hypothesized.

While protocol C (modified CIWA-Ar) was used in the majority of patients in the protocol group, 20 out of the 52 protocol patients were prescribed protocol A and B. It is therefore clear that prescribers found the protocol helpful, and the protocol group was offered different assessment and treatment than the TAU group. It is also notable that, at our hospital, prior to implementation, use of CIWA-Ar was not the standard of care, so implementation of the protocol likely also increased use of this evidence-based tool. In addition, the CIWA-Ar in protocol C had modifications tailored to the acutely ill psychiatric population. Together, these observations suggest that prescribers found utility in using an AWS protocol designed for this population.

We also found a statistically significant increase in thiamine administration for those patients at risk for AWS following implementation of the protocol. Although differences in rates of adverse events that favored our protocol's safety were observed, they were not statistically significant. This is not surprising, given that the study was not powered to detect any significant difference in rates of these relatively rare adverse events.

Previous studies in medical/surgical and inpatient detoxification unit populations have shown the benefits of using protocols based on symptom-triggered dosing and on a combination of fixed-dose and symptom-triggered dosing. These methods have been shown to reduce the duration of benzodiazepine treatment, and the total benzodiazepine dose administered, without worsening the severity of AWS or increasing the incidence of seizures or DTs, and in some studies, with reductions demonstrated in these complications.²⁻⁵ This study further supports the use of standardized protocols that use a combination of fixed-dose and symptom-triggered dosing and adds an option for symptom-triggered dosing based solely on objective measures for those patients for whom the use of CIWA-Ar is contraindicated.

Though CIWA-Ar has become one of the gold standards for the treatment of alcohol withdrawal in hospital settings, the presence of acute psychiatric illness often complicates the use of this protocol due to the significant overlap of psychiatric symptoms and AWS. To address this issue, we implemented and studied a protocol that allowed physicians to choose an alcohol withdrawal protocol based in part on risk of the development of severe alcohol withdrawal, and in part on the impact that psychiatric comorbidity has on the utility of the CIWA-Ar protocol (Fig. 2). This flexibility is crucial in the diverse psychiatric inpatient population, as it not only allows for the gold-standard CIWA-Ar method to be used for those patients for whom it is feasible, but also allows for an alternative symptom-triggered dosing method to be used in those patients whose psychiatric symptoms confound the interpretation of the CIWA-Ar. It also gives clinicians the option to aggressively treat AWS in those patients who are at a significant risk of seizures and DTs with a fixed-dosing regimen.

There was a higher prevalence of an alcohol use disorder diagnosis in the postimplementation group suggesting that this group may have inherently had more alcohol-related illness. It is more likely, however, that following the implementation of the standardized protocol and associated education, psychiatrists were more likely to recognize alcohol use disorder than they were prior to the implementation of the protocol. In fact, despite there being a higher known prevalence of alcohol use disorder in the postimplementation group, this group received less total cumulative benzodiazepine dose and over a shorter timeframe.

The findings of shorter duration and lower cumulative benzodiazepine dose, without elevation in withdrawal complications, in the postimplementation group indicate that implementing a standardized protocol likely led to more effective and appropriate management of AWS. We suspect that prior to implementation of the protocol, more patients were getting unnecessary doses of benzodiazepines due to difficulty differentiating between symptoms related to AWS vs psychiatric comorbidities. With less unnecessary exposure to

benzodiazepines, the risks of over-sedation, falls, and respiratory depression would be reduced, although we did not specifically measure these outcomes in our study.

Moreover, the use of a standardized AWS protocol was associated with significantly increased administration of thiamine. Thiamine deficiency is under-recognized despite its high prevalence, as the classic triad of ocular findings, cerebellar dysfunction, and confusion present in only a minority of alcohol use disorder patients. The risks of administering thiamine are essentially none, while the risk of under-treating thiamine deficiency can be profound.

Our findings around the increased rates of recognition of alcohol use disorder following protocol implementation point to other opportunities for optimizing treatment. Next steps could include developing standardized methods of ensuring that inpatient psychiatric teams consider evidence-based relapse-prevention strategies, including offering medications shown to help with relapse prevention (eg, naltrexone, acamprosate), and referring for structure relapse prevention therapy. Psychiatric hospitalizations are critical opportunities to ensure linkages to appropriate psychosocial and pharmacologic treatments for substance use disorders following discharge.

As a pilot study, our investigation necessarily focused on proxy outcomes, the dosage and duration of benzodiazepine use, rather than key outcome of the serious consequences that the protocol is intended to prevent (seizures, DTs, death). Given the rare frequency of these key outcomes, it would be quite difficult to power a study to detect significant changes in these, and most of the available literature on AWS assessment and treatment methods has therefore relied on these same proxy outcomes. Since one of the concerns with TAU, which included the use of CIWA-Ar, is that psychiatric symptoms might unnecessarily trigger the benzodiazepine administration, it seems likely that the lower use of these meds postimplementation reflects positively on the modified protocol, but reaching this conclusion depends on a positive interpretation of the data, and it remains possible that the postimplementation pattern of use of benzodiazepine use may actually represent a lack of sensitivity of the modified protocol, with a possibly increased risk of negative consequences.

There are several other limitations to our study. First, in a retrospective cohort, it is difficult to control for AWS severity or individual physician prescribing practices. In fact, despite institutional standardization, different physicians and healthcare staff documented patient assessments and medication administration in different ways, despite training, and this may have resulted in observer bias. Second, our study was retrospective in design, and data were collected from two separate time periods in a nonrandomized way. This makes it possible that these two groups were fundamentally different. We collected relevant baseline data to detect differences that could confound our conclusions based on our results (Table 1). From the demographic data, we found that there was a significantly higher prevalence of alcohol use disorder in the postimplementation group. We speculate that the implementation of the AWS protocol likely led to more frequent recognition of alcohol-related illnesses in the postimplementation group. Even if alcohol-related illnesses were, in fact, more frequent or severe in the postimplementation group it would be expected to bias results toward longer duration of benzodiazepine treatment and greater cumulative doses, which is the opposite of

what was observed. We believe this makes our findings more robust. Third, we did not examine the use of other sedative-hypnotic drugs that could have confounded the results of this study. No restrictions were placed on their use in any of the protocols, nor did local practitioners or protocol developers express concerns with using agents such as zopiclone concomitantly with benzodiazepine therapy. While we do not have a reason to suspect that preimplementation and postimplementation use of other agents differed, we did not measure this variable and such differences, if present, could bias the results. Finally, while our primary outcome measures serve as a proxy for duration and severity of AWS, further data must be collected to confirm the effect on other clinical outcomes (length of hospital stay, other comorbidities, etc.).

CONCLUSIONS

This study provides preliminary evidence for the efficacy and safety of a novel standardized AWS assessment and treatment protocol for psychiatric inpatients. Randomized prospective trials are needed to confirm these findings and understand how to optimally manage alcohol withdrawal in acutely ill psychiatric inpatients.

Acknowledgments

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FIGURE 1.
Study design and flow. ITT = intention-to-treat.

Patient: _____ Allergies: _____
 Items preceded by a **bullet** (•) are active orders. Items preceded by a **checkbox** (☐) are only to be carried out if checked.
For patients being assessed or treated for a psychiatric disorder, who are also at risk for alcohol withdrawal.

1. Investigations

Complete for all patients at risk of Alcohol Withdrawal Syndrome. Order any tests not already completed.

☐ Profile	☐ Electrolytes	☐ Vitamin B12, RBC-folate
☐ Mg, Ca, PO ₄	☐ Glucose	☐ Serum alcohol level
☐ ALT, AST, Alk Phos, GGT	☐ Total bilirubin, INR	☐ Albumin
☐ Urine toxicology screen		

2. Vitamin Replacement

- Thiamine 100 mg IM on Day 1 (Administer prior to glucose), then Thiamine 100 mg PO daily x 5 days (Days 2-6)
- Multivitamin 1 tab po daily x 5 days
- ☐ Niacin 100 mg po daily x 2 weeks (For suspected Pellagra)

3. Alcohol Withdrawal Management (Select one protocol and one medication)

For all protocols listed below

- If acute onset benzodiazepine intoxication, do not give benzodiazepine dose and notify prescriber.
- If symptoms of alcohol withdrawal worsen OR no improvement after TWO consecutive doses, notify prescriber.

☐ Protocol A – Patients at significant risk of developing severe alcohol withdrawal

- ☐ Diazepam 10 mg PO q1h x 3 doses, then Diazepam 10mg PO q1h prn dosing if ANY signs or symptoms of alcohol withdrawal are present. If dose exceeds 60mg in 24h, call prescriber.
- ☐ Lorazepam 2 mg PO q1h x 3 doses, then Lorazepam 2mg PO q1h prn dosing if ANY signs or symptoms of alcohol withdrawal are present. If dose exceeds 12mg in 24h, call prescriber.
- Assess vitals and signs of withdrawal q1h while awake, until no symptoms x 24h.
- Discontinue protocol 24h after symptom resolution.

☐ Protocol B – Patients at risk of developing alcohol withdrawal AND displaying psychiatric symptoms interfering with the patient's ability to accurately report withdrawal symptoms, or interfering with our ability to ascertain the source of the symptoms

- ☐ Diazepam 10 mg PO q2h prn for equal to or greater than 2 objective signs of alcohol withdrawal. If dose exceeds 60mg in 24h, call prescriber.
- ☐ Lorazepam 2 mg PO q2h prn for equal to or greater than 2 objective signs of alcohol withdrawal. If dose exceeds 12mg in 24h, call prescriber.
- Assess vitals and signs of withdrawal q2h while awake, until no symptoms x 24h
- Discontinue protocol 24h after symptom resolution.

☐ Protocol C - For all other patients at risk of developing alcohol withdrawal.

- CIWA-Ar score on admission (Performed by admitting physician) _____
- ☐ Diazepam 10mg PO q2h prn for CIWA-Ar scores 9-15. If dose exceeds 60mg in 24h, call prescriber.
- ☐ Lorazepam 2mg PO q2h prn for CIWA-Ar scores 9-15. If dose exceeds 12mg in 24h, call prescriber.
- Contact physician for CIWA-Ar scores greater than 15
- CIWA-Ar and Vitals q2h while awake if CIWA-Ar score greater than or equal to 9
- CIWA-Ar and Vitals q4h while awake if CIWA-Ar scores of 8 or less
- Do not give benzodiazepine if no objective signs of withdrawal AND clinical suspicion that elevation of CIWA-Ar score greater than 8 due solely to psychiatric co-morbidity.
- Discontinue protocol 24h after symptom resolution.

Prescriber's Signature: _____ Date (yyyy/mm/dd): _____

Prescriber's Name _____ Reg. No. _____

Protocol	
A	<p>Protocol A – Patients at significant risk of developing severe alcohol withdrawal, regardless of current psychiatric symptoms.</p> <p>Risk factors: History of alcohol withdrawal seizures, delirium tremens, co-morbid sedative dependence, head injury, CNS disease, advanced age, withdrawal symptoms emerging even with significantly elevated serum alcohol level.</p> <p>Before initiating Protocol A, consider admission or transfer to a medical unit.</p> <p>For patients on protocol A, switch from Protocol A to a standing taper after the patient has been stabilized on either lorazepam or diazepam for 48h. Stabilized means still receiving doses, but not delirious, and not having worsening symptoms nor requiring escalating doses. To initiate a taper, calculate the initial 24h benzodiazepine requirement, and taper by 20-25% per day (e.g. The first day of the taper, the patient would receive 20-25% less than the initial 24-hr benzodiazepine requirement.)</p>
B	<p>Protocol B – Patients at risk of developing alcohol withdrawal AND Displaying psychiatric symptoms interfering with patient's ability to accurately report withdrawal symptoms (e.g. disorder of thought or speech interfering with ability to communicate) OR Interfering with clinician's ability to interpret the source of these symptoms (e.g. for a patient with a comorbid psychotic disorder, one might not be able to determine whether perceptual disturbances were due to withdrawal vs. the psychotic disorder)</p>
C	<p>Protocol C - For all other patients at risk of developing alcohol withdrawal.</p> <p>If patient is on an antiadrenergic agent, consider seizure prophylaxis even if CIWA-AR scores remain low.</p>

Other recommendations for prescribers:

- Consider lorazepam if hepatic dysfunction or age greater than 65 years old.
- Consider more frequent assessment of signs and symptoms of alcohol withdrawal initially if patient's blood alcohol level is elevated at time of first assessment.

Symptoms of Benzodiazepine Intoxication:

- Over sedation, nystagmus, ataxia, dysarthria, disorientation, and/or respiratory rate less than 8/min.

FIGURE 2.

Preprinted order. Inpatient Management of Alcohol Withdrawal Syndrome Acute Psychiatric Inpatients (IMAW Protocol).

TABLE 1.

Baseline sample characteristics by group

Clinical characteristics	Timing in relation to the implementation of protocol, no. of patients (%)	
	Before (n = 83)	After (n = 55)
Age, y, mean $\pm$ SD	41.8 $\pm$ 14	44.6 $\pm$ 14.3
• Male	54 (65)	40 (73)
• Female	29 (35)	15 (27)
Benzodiazepine use on admission	26 (31)	12 (22)
History of alcohol-withdrawal seizure	8 (10)	2 (4)
History of delirium tremens	2 (2)	1 (1)
Diagnosis of alcohol use disorder	43 (52)	47 (86)
Diagnosis of polysubstance dependence (DSM-IV)	17 (20.5)	8 (14.5)
Reason for admission		
• Suicidal ideation or attempt	63 (76)	33 (60)
• Psychosis	9 (11)	8 (15)
• Mania	6 (7)	10 (18)
• Depression	2 (2)	3 (6)
• Other	3 (4)	1 (2)
Nonsubstance-related psychiatric disorder		
• Major depressive disorder	10 (12)	7 (13)
• Bipolar I disorder	7 (8)	9 (16)
• Adjustment disorder	33 (40)	13 (24)
• Psychotic disorder	15 (18)	6 (11)
• Anxiety disorder	5 (6)	4 (7)
• Personality disorder or traits	13 (16)	12 (22)
Comorbid substance use		
• Nicotine	26 (31)	26 (47)
• Cocaine	16 (19)	8 (15)
• Opioid	8 (10)	9 (16)
• Cannabis	36 (43)	17 (31)
• Benzodiazepine	9 (11)	8 (15)
• Stimulants	5 (6)	2 (4)
Other medical illness		
• Hepatic disease	7 (5.3)	1 (2)
• Seizure disorder	3 (3.6)	0 (0)
• Previous head injury	9 (10.8)	0 (0)
• Cardiovascular disease	16 (19.3)	10 (20.4)
• Chronic pain disorder	15 (18.1)	10 (20.4)

TABLE 2.
Treatment and monitoring time for alcohol withdrawal and total benzodiazepine dose

Outcome	Timing in relation to implementation of protocol		
	Before (n = 83)	After (n = 55)	P-value
Time treated with benzodiazepines, h, median (IQR)	19.7 (0-46)	0 (0-26)	.004
Treated with benzodiazepines for longer than 24 hours, n (%)	37 (45)	14 (26)	.03
Total time on AWS protocol, h, median (IQR)	75 (49.3-141.3)	34 (24-58)	<.0001
Total benzodiazepine dose, mg (diazepam equivalents), median (IQR)	30 (0-65)	5 (0-30)	.009
Administered any benzodiazepine dose, n (%)	61 (74)	28 (51)	.01

IQR = interquartile range.