mhc
MENTAL HEALTH CLINICIAN

ORIGINAL RESEARCH Open Access

Implementation of mMINDS monitoring for alcohol withdrawal at an inpatient academic psychiatric facility

Leah A. Surbaugh, PharmD, BCPP[1]; Taylor Kelsey, PharmD, BCPP[2]; Brittany L. Melton, PharmD, PhD[3]; Karen E. Moeller, PharmD, BCPP[4]

How to cite: Surbaugh LA, Kelsey T, Melton BL, Moeller KE. Implementation of mMINDS monitoring for alcohol withdrawal at an inpatient academic psychiatric facility. Ment Health Clin [Internet]. 2025;15(4):201-7. DOI: 10.9740/mhc.2025.08.201.

Submitted for Publication: September 3, 2024; **Accepted for Publication:** April 2, 2025

Abstract

Introduction: Patients who abruptly stop the consumption of alcohol are at risk of alcohol withdrawal syndrome (AWS). Guidelines recommend the use of a validated clinical withdrawal scoring tool to assess the severity of a patient's withdrawal. The modified Minnesota Detoxification Scale (mMINDS) provides detailed definitions to help guide nurses in objectively scoring patients' withdrawal symptoms. Although mMINDS has been validated in a medical intensive care unit, it has not yet been validated in a psychiatric facility.

Methods: The primary objective was to determine if using mMINDS was preferred by nurses and increased confidence in assessing AWS compared with the current standard of care in an adult inpatient psychiatric hospital. After 3 months of using mMINDS, nurses were asked to complete a survey to assess their preference and confidence with mMINDS. A retrospective review was also conducted on all patients, 18 years and older, who were monitored for AWS both pre- and post-implementation of mMINDS.

Results: Overall, 60% (n = 12) of nurses selected mMINDS as the scoring tool they felt most confident with assessing AWS. Patients in the mMINDS group also received lower cumulative doses of benzodiazepines, although this finding did not reach statistical significance (0.75 mg post-implementation vs. 1.75 mg pre-implementation [$P = 0.101$]).

Discussion: The use of mMINDS was preferred by nurses for monitoring AWS in patients hospitalized at an inpatient psychiatric hospital. These results suggest that mMINDS may be an effective tool for monitoring AWS in an inpatient psychiatric setting.

Keywords: psychiatry, alcohol withdrawal, modified Minnesota Detoxification Scale, alcohol, Clinical Institute Withdrawal Assessment for Alcohol

[1] Assistant Professor, East Tennessee State University Bill Gatton College of Pharmacy, Johnson City, Tennessee, ORCID: https://orcid.org/0000-0001-7521-2153; [2] Psychiatric Clinical Pharmacist, University of Kansas Health System, Kansas City, Kansas, ORCID: https://orcid.org/0009-0009-8929-9734; [3] Professor and Interim Chair, The University of Kansas School of Pharmacy, Lawrence, Kansas, ORCID: https://orcid.org/0000-0002-6994-753X; [4] (Corresponding author) Clinical Professor, The University of Kansas School of Pharmacy, Lawrence, Kansas, kmoeller@kumc.edu, ORCID: https://orcid.org/0000-0002-2863-8335

Disclosures: The authors have no conflicts of interest to disclose.

Introduction

Excessive alcohol consumption accounts for an estimated 3.8% of all global deaths, with a significant financial burden on the healthcare system.[1] Patients who consume excessive alcohol are at an increased risk for alcohol withdrawal syndrome (AWS). This serious medical condition that can occur when an individual abruptly stops the consumption of alcohol after periods of chronic or excessive use.[2,3] In 2022, approximately 29.5 million people in the United States were diagnosed with alcohol use disorder. It is estimated that more than 500 000 patients annually will require pharmacologic treatment for AWS.[4,5] Symptoms of AWS can vary in severity, ranging from mild discomfort to life-threatening symptoms such as seizures, alcohol withdrawal delirium, and even death.[5] While AWS is commonly seen in inpatient medical and intensive care units (ICU), psychiatric patients are also at high risk for AWS. One study found that 19%

of patients requiring treatment for AWS were admitted to a psychiatry unit.[6]

Treatment of AWS commonly depends on symptom severity. The 2020 American Society of Addiction Medicine guideline for alcohol withdrawal recommends the use of a validated clinical withdrawal scoring tool to assess the severity of a patient's withdrawal.[7] A 2019 study evaluating the use of alcohol withdrawal tools within the United States identified that 84% of institutions surveyed utilized the Clinical Institute Withdrawal Assessment for Alcohol (CIWA-A) for assessing withdrawal symptoms.[8] The CIWA-Ar is an abbreviated version of the scale that assesses 10 clinical symptoms on a scale of 1 to 7 (except orientation on a scale of 1–4) with a score of greater than 8, typically warranting treatment with a benzodiazepine. While the CIWA-Ar has been shown to be a safe and effective tool in the hospital, it may not be appropriate in all settings.[9] One limitation of the CIWA-Ar is that it requires patients to respond to 7 of 10 items, making it challenging to use in patients who need translators or are disoriented, nonverbal, or unable to communicate, such as in ICU and psychiatric settings. A study by Hecksel et al[9] found that 23% of patients at their institution monitored on CIWA-Ar were unable to effectively communicate, making the scale inappropriate to use in those patients.

Moreover, several of the items on the CIWA-Ar are common symptoms psychiatric patients may experience outside AWS, such as anxiety, agitation, and hallucinations. These items can be challenging for the evaluator, commonly nurses, to appropriately score a psychiatric patient being monitored for AWS. Proper training is essential for using the CIWA-Ar, along with other scales; however, some degree of subjectivity in scoring remains, making it challenging for nurses who commonly conduct the scoring. Unfortunately, studies have shown that thorough training does not always occur for nurses. One study of nurses found only 36% felt they were adequately trained to administer the CIWA-Ar.[10] Furthermore, a study assessing nurses' perspective on the use of the CIWA-Ar identified that 23% of nurses indicated they had overestimated a score to administer a benzodiazepine when they felt it was indicated, and 10% had underestimated a score.[10]

The Minnesota Detoxification Scale (MINDS) was developed in 2007 for use in ICU patients to help remove some of the subjective components (eg, anxiety) and the need for the patient to respond to questions commonly seen in other withdrawal scales, such as CIWA-Ar.[11] MINDS is a 9-item scale that assesses symptoms of agitation, delusions, hallucinations, orientation, seizures, sweat, tremors, and vital signs. The MINDS scale has been further adapted by Heavner et al[12] to provide more precise explanations for scoring, creating the modified MINDS (mMINDS) scale. For example, mMINDS provides clear and objective definitions for mild, moderate, and severe tremors regarding observation of a patient with detailed instructions to obtain with "patient's arms extended and fingers spread." A severe tremor is described as "noticeable even with arms not extended," which differs from a moderate tremor that is "noticeably visible with arms extended." Additionally, mMINDS provides detailed scoring for hallucinations and agitation that may provide clearer explanations for psychiatric patients.

The mMINDS is a validated scale supported by the American Society of Addiction Medicine guidelines.[13] Pairing the mMINDS scale with a symptom-triggered benzodiazepine protocol found a decreased risk for intubation in medical ICUs.[12] Only 1 study was identified that assessed the mMINDS outside of the ICU setting, including patients on an inpatient medical service. This study found a revised MINDS scale within an inpatient medical unit led to decreased benzodiazepine use in patients being treated for AWS.[14] It should be noted this study did not use the MINDS tool as initially developed; however, it used a revised version of the tool. Furthermore, research has found nurses to prefer mMINDS compared with CIWA-Ar due to its ease of use.[13]

Using subjective scales for a psychiatric population can be problematic for nurses to be able to confidently assess AWS as patients are not always able to appropriately respond to questions. This study aimed to assess the impact of the mMINDS on a nurse's confidence in evaluating patients for AWS within a psychiatric facility. Additionally, this study evaluated preferences between the 2 tools, the ability of the score to match that of a fellow nurse, and confidence in scoring specific symptoms of hallucinations and agitation.

Methods

This study was conducted at a 47-bed, free-standing, adult inpatient academic psychiatric hospital in the Midwest and was approved by the university's institutional review board. The primary outcome of the study was to determine if the use of the mMINDS increased nurses' confidence in assessing patients for AWS compared with our current scale, the Alcohol Withdrawal Assessment Scale (AWAS).[15]

The AWAS is an 11-item scale similar to CIWA-Ar and mMINDS with minor differences.[15] Six items assess somatic symptoms (vitals, sweating, and tremors), and 5 assess mental symptoms (anxiety, agitation/restlessness, conversation, hallucinations, and orientation). Most items are scored 0 to 3, with hallucinations and agitation or restlessness scored up to 4 and anxiety and respirations up to 2. Unlike CIWA-Ar, AWAS does not assess nausea or vomiting, headaches, or separate the types of hallucinations. AWAS, like CIWA-Ar, requires patient engagement for scoring anxiety, conversation, and hallucinations.

In October 2023, all nurses at our psychiatric hospital were trained on mMINDS, and implementation occurred on

October 23, 2023. Nurses were trained through a 10-minute presentation at 2 staff meetings and handouts detailing how to use mMINDS and the differences between AWAS. During training, emphasis was placed on scoring for agitation, hallucinations, and delusions, and if unable to assess, to score a zero for delusions. Nurses were provided time for questions with a week for adjustment and to ensure comfortability with mMINDS before data collection. During the trial period, nurses exclusively used mMINDS, and was embedded in the electronic health record.

After 3 months of using mMINDS, nurses were asked to complete a voluntary, 2-minute, anonymous survey to assess their preference and confidence in using mMINDS compared with AWAS. The survey was distributed to all nurses who had used AWAS in the pre-implementation period and mMINDS in the post-implementation period. There was no minimum number of patients a nurse needed to score to be included. Nurses completed the survey through either REDCap, a secure data collection platform, or on a paper copy. The survey included 11 demographic questions and 8 specific questions aimed at the confidence of nurses to score a patient appropriately. Relevant background information was obtained, including length of time as a psychiatric nurse, time to complete each scale, and number of patients monitored for AWS within the past month. The 8 confidence-based questions required nurses to select either AWAS or mMINDS as the preferred tool. Questions included confidence in the overall assessment, confidence in scores matching that of fellow nurses, confidence on when to administer a benzodiazepine, and confidence in scoring hallucinations and agitation. Then, nurses rated the ease of use of both the AWAS and mMINDS on a scale of 1 to 9, with 1 being easiest and 9 being hardest. Last, nurses were asked to select which they felt was best for assessing alcohol withdrawal, AWAS or mMINDS. This survey was adapted from a previous study that assessed nursing preference between scales with modifications to include additional questions specifically comparing AWAS with mMINDS.[13]

A retrospective chart review comparing clinical outcomes of the AWAS and mMINDS was completed 3 months after the implementation of mMINDS to assess secondary objectives. These objectives included comparing cumulative total dose of benzodiazepine dosages in lorazepam equivalents, individual scale items that led to benzodiazepine administration, and length of stay. All benzodiazepine doses were converted to lorazepam equivalents, as lorazepam is the main benzodiazepine in our AWS order set; however, intravenous midazolam is sometimes used in the emergency department before transfer. The dose of intravenous midazolam was converted to lorazepam equivalents on a ratio of 2.5:1. At our facility, benzodiazepines are administered when the cumulative score in AWAS or mMINDS is 6 or higher.

The chart review included all patients, 18 years or older, who were monitored for AWS during either the pre-(November 1, 2022 to January 31, 2023) or post-(November 1, 2023 to December 31, 2023) implementation of mMINDS. Patients were identified via the Healthcare Enterprise Repository for Ontological Narration, an internal research database.[16,17] Patients were excluded if they were monitored at an outside facility for more than 24 hours before transfer or received a scheduled benzodiazepine taper. The electronic health records of eligible patients were then reviewed. Basic demographics were collected, including primary discharge diagnoses, alcohol history, and medications used to treat AUD. Cofounding medications, such as anticonvulsants, antihypertensives, and phenobarbital use, were also collected.

TABLE 1: Background characteristics of nurses completing the survey

Background Characteristics (N = 20)	N = 20
Median age, years (IQR)	36 (32-44)
Sex, n (%)	
Male	3 (15)
Female	16 (80)
Prefer not to say	1 (5)
Race, n (%)	
White/Caucasian	14 (70)
Black/African American	1 (5)
Asian	2 (10)
Hispanic/Latino	1 (5)
Prefer not to say	2 (10)
Shift, n (%)	
Day	12 (60)
Evening	8 (40)
Length of time as a nurse in years, median (IQR)	10 (1.75-14.5)
Length of time as a nurse in a psychiatric facility in years, median (IQR)	4.5 (1.75-10)
Estimated number of patients cared for with alcohol withdrawal in the last month, median (IQR)	6 (3-10)
Length of time to score a patient in minutes, median (IQR)	
AWAS	5 (3.25-5)
mMINDS	5 (3-5)

AWAS = Alcohol withdrawal assessment scale; mMINDS = modified Minnesota Detoxification Scale.

Primary analysis was performed through SPSS v. 27 (IBM, Armonk, New York) to yield descriptive statistical findings. For continuous variables, mean and median were assessed for the time needed to completely score a patient's symptoms, cumulative benzodiazepine dose received, and average time monitored for withdrawal. Discrete variables, including the results of the nurses' survey, were compared using frequencies and percentages. Secondary objectives were assessed with the Mann-Whitney *U* test. Statistical significance was defined as having a P value < 0.05.

Results

A total of 50 nurses were invited to complete the mMINDS post-implementation survey, with 20 nurses (40%) completing it. Demographics are shown in Table 1. Nurses completing the

TABLE 2: Nurse survey response comparing the AWAS and mMINDS

Nurse Perspectives Comparing Tools (N = 20)	AWAS n (%)	mMINDS n (%)
I feel more confident overall in assessing a patient's withdrawal symptoms using	8 (40)	12 (60)
I feel more confident my score would match that of a fellow nurse using	6 (30)	14 (70)
I feel more confident that a benzodiazepine is warranted for symptoms based on a patient's score using	10 (50)	10 (50)
I feel more confident assessing a patient for agitation using	8 (40)	12 (60)
I feel more confident assessing a patient for hallucinations using	8 (40)	12 (60)
Based on personal preference, please choose the alcohol withdrawal scale you feel has the best performance for assessing the severity of alcohol withdrawal	8 (40)	12 (60)
How easy is the ___ to use on a scale of 1-9 (1 being the easiest, 9 being the hardest): mean ± SD	4.45 ± 2.78	4.05 ± 3.17

AWAS = Alcohol withdrawal assessment scale; mMINDS = modified Minnesota Detoxification Scale.

survey were predominantly female (80%) and White (70%), with a median of 4.5 years as a nurse in a psychiatric practice setting. Nurses estimated caring for a median of 6 patients being monitored for AWS within the past month.

Results of the responses for assessing nurses' confidence and preference are shown in Table 2. Among nurses who completed the post-implementation survey, 12 (60%) selected mMINDS as the scale they felt had the best performance in assessing the severity of AWS. All confidence-specific questions had more respondents indicated confidence with mMINDS except for confidence when a benzodiazepine was needed, which was split equally between groups. Fourteen nurses (70%) felt their score was more likely to match that of a fellow nurse using mMINDS compared with AWAS. Nurses reported mMINDS to be easier to use, with an average ease of use score of 4.05 compared with AWAS ease of use of 4.45, although it was not statistically significant ($P = 0.352$).

Data from chart reviews for secondary endpoints are shown in Tables 3 and 4. A total of 129 patients were identified for our study, and 69 met the criteria for inclusion in the retrospective

TABLE 3: Background characteristics of patients monitored for alcohol withdrawal

Background Characteristics	AWAS (n = 33)	mMINDS (n = 36)	*P* value
Median age, years (IQR)	45 (30-55)	43 (31.5-52)	0.683
Race, n (%)			0.557
White/Caucasian	23 (69.7)	23 (63.9)	
Black/African American	7 (21.2)	8 (22.2)	
Asian	0 (0.0)	0 (0.0)	
Hispanic/Latino	2 (6.1)	1 (2.8)	
Other/Unknown	1 (3.0)	4 (11.1)	
Sex, n (%)			0.018
Male	26 (78.8)	18 (50)	
Female	7 (21.2)	17 (47.22)	
Other/Unknown	0 (0.0)	1 (2.77)	
Median alcohol level on admission (IQR)	105 (0-252)	108.5 (0-214.25)	0.255
Missing, n (%)	3 (8.5)	0 (0.0)	
Frequency of alcohol consumption, n (%)			0.610
Daily	20 (60.6)	22 (61.1)	
2–3 times weekly	6 (18.2)	3 (8.3)	
Weekly	1 (3.0)	3 (8.33)	
Binge drinking	3 (9.1)	5 (13.9)	
Social drinking	1 (3.0)	2 (5.6)	
Missing	2 (6.1)	0 (0.0)	
History of complicated withdrawal, n (%)	5 (15.2)	4 (11.1)	0.728
History of delirium tremens, n (%)	2 (6.1)	3 (8.3)	> 0.999
Previous admission for alcohol withdrawal, n (%)	16 (48.5)	16 (44.4)	0.647
Medication started for alcohol use disorder, n (%)	10 (30.3)	12 (33.3)	0.787
Discharge Diagnosis			
Mood disorder	14 (42.4)	18 (50)	0.528
Substance use disorder	27 (81.8)	23 (63.9)	0.096
Anxiety-related disorders	3 (9.1)	9 (25)	0.082
Trauma-related disorders	3 (9.1)	10 (27.8)	0.047
Schizophrenia spectrum disorders	4 (12.1)	3 (8.3)	0.603

AWAS = Alcohol withdrawal assessment scale; mMINDS = modified Minnesota Detoxification Scale.

TABLE 4: Secondary endpoints assessing total dose of benzodiazepine administered and length of time being monitored for alcohol withdrawal

Benzodiazepine Administration	AWAS (n = 33)	mMINDS (n = 36)	*P* value
Median cumulative total dose of benzodiazepine administered, mg (IQR)	1.75 (0-4.6)	0.75 (0-2.4)	0.101
Median length of time being monitored, days (IQR)	2 (1-3)	2 (1.5-2.5)	0.272

AWAS = Alcohol withdrawal assessment scale; mMINDS = modified Minnesota Detoxification Scale.

chart review, 33 in the AWAS and 36 in the mMINDS group. Patients were primarily excluded because of not having documented scores, and 2 patients were started on a fixed benzodiazepine taper. Most patients in both groups were White and reported daily consumption of alcohol. In the pre-implementation group, 26 (78.8%) patients were male, compared with 18 (50%) in the post-implementation group ($P = 0.018$). Regarding primary discharge diagnoses, more patients in the mMINDS group (27.8%) had a higher rate of trauma or stress-related diagnoses compared with the AWAS group (9.1%), $P = 0.047$. The median cumulative total dose of benzodiazepine in lorazepam equivalents was smaller for those monitored with mMINDS compared with AWAS (0.75 versus 1.75 mg; $P = 0.101$). Three potentially confounding medications were used in both the AWAS and mMINDS groups as follows: phenobarbital (3 vs 1, respectively), clonidine (3 in both groups), and gabapentin (9 vs 5, respectively). Additionally, there was no difference in time spent monitoring patients between the 2 groups ($P = 0.148$).

Discussion

To our knowledge, this is the first study to evaluate the use of mMINDS in an inpatient psychiatric hospital. Among the nurses who completed the survey, 70% perceived that mMINDS produced more consistent scores among their fellow nurses compared with the AWAS. Additionally, 60% of these nurses preferred mMINDS over AWAS, similar to the previous study in ICU patients, where 69.7% preferred mMINDS over other withdrawal scales.[13]

Nurses further rated mMINDS as easier to use compared with AWAS, aligning with previous findings regarding the ease of use of mMINDS compared with traditional withdrawal tools.[13] They also reported more confidence in assessing hallucinations and agitation with mMINDS, symptoms commonly present in psychiatric patients. These positive outcomes with mMINDS may be attributable to its detailed explanations for objectively scoring both hallucinations and agitation withdrawal symptoms, highlighting the importance of these definitions. Furthermore, the reduced subjectivity of the scoring in the mMINDS, providing clearer and more consistent criteria, likely contributed to the increased confidence reported by nurses using this tool. Although not assessed in this study, it is possible that benefit would also be seen with patients who are non-verbal or require a translator to communicate as the tool does not require the patient to respond verbally.

Our study found a decrease in the median total cumulative benzodiazepine administration between both groups, with patients in the pre-implementation group receiving 1.75 mg compared with patients in the post-implementation group receiving 0.75 mg. The decrease in benzodiazepine usage observed with mMINDS is similar to Krcmarik et al,[14] which also found decreased total benzodiazepine administration after implementation of a revised MINDS in the ICU and non-ICU setting with 21.2 mg in the pre-implementation compared with 12 mg in the post-implementation period. Although our study did not observe a statistically significant decrease, a 1 mg reduction in benzodiazepine administration post-implementation likely represents a clinically significant finding. The lack of statistical significance in our study is likely due to our small sample size and other cofounders. Of note, the cumulative total dosing of benzodiazepines included all administrations, regardless of whether they were related to withdrawal score. While 3 patients in the AWAS and 2 patients in mMINDS groups were taking a benzodiazepine before admission, no scheduled benzodiazepines were ordered for these patients, and their scores on either scale did not require benzodiazepine administration. Furthermore, it is possible that not all doses of benzodiazepine administered were accounted for if not readily available from outside emergency department records or in chart review.

The reduction in benzodiazepine use observed in our study is an important finding, given the associated risks of adverse effects from benzodiazepines, such as sedation, falls, respiratory depression, and dependency.[18,19] Additionally, decreasing benzodiazepine use during treatment minimizes the need to prescribe these medications upon discharge, thereby reducing outpatient risks, misuse, and dependency. Furthermore, studies have shown that benzodiazepine-sparing protocols for AWS limit benzodiazepines use and decrease the length of hospital stays and the risk of ICU admission.[18] These findings highlight the value of adopting the mMINDS protocol in an inpatient psychiatric setting.

While baseline demographics, including alcohol withdrawal history, alcohol consumption, and co-occurring diagnosis, were similar between groups (except trauma-related conditions), significantly more males were in the AWAS group (78.8%) compared with mMINDS group (50%), $P = 0.018$. This difference

may contribute to the variations observed in benzodiazepine usage, as biological males are often reported to have more complicated withdrawal symptoms.[20] However, studies on benzodiazepine usage by biological sex show mixed results. A Polish study found that males received diazepam more frequently and at higher dosages for AWS treatment.[21] Conversely, another study found that females received higher doses of diazepam in general medical units, with no sex differences observed in the emergency department or lorazepam usage.[22] While biological sex likely influences AWS presentation and treatment, further studies are needed to clarify these differences in benzodiazepine usage.

A major limitation of this study was an extenuating technical issue identified within the electronic health record within the first few weeks of implementation. It was discovered that vitals (heart rate and blood pressure) would automatically score into the flowsheet for the AWAS, but this function was not available within mMINDS documentation framework. Despite requests being made to match the technologies, a remedy was not completed during the study time frame. This may have affected results on nurse preference between the scales and overall time spent monitoring patients on mMINDS.

In addition, this study had several other limitations. Concerning the nursing survey, our study had a 40% response rate with only 20 nurses completing it. We could not provide incentives for completing the survey; providing incentives could have potentially increased survey response rates. Additionally, while nurses reported increased confidence that their score would match that of a fellow nurse, this was not verified by having more than 1 nurse score a patient. Furthermore, data collection relied on retrospective chart review, meaning that not all information was readily available for some patients and revealed variability in provider documentation, such as frequency of alcohol consumption. Last, this was a single-site study, and our findings should be validated at another psychiatric hospital to ensure the generalizability of these results.

Conclusions

Nurses in our study who practiced in an inpatient psychiatric setting reported a preference for using mMINDS to monitor AWS, noting increased confidence in assessing symptoms. Clinically meaningful reductions in lorazepam-equivalent use were observed in patients managed with mMINDS. While these findings suggest that mMINDS may be a valuable tool for AWS monitoring in inpatient psychiatric settings, further research with a larger patient population and over a longer timeframe is needed.

References

1. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. Lancet. 2009;373(9682):2223-33. DOI: 10.1016/S0140-6736(09)60746-7
2. Sachdeva A, Choudhary M, Chandra M. Alcohol withdrawal syndrome: benzodiazepines and beyond. J Clin Diagnostic Res. 2015;9(9):VE01-7. DOI: 10.7860/JCDR/2015/13407.6538
3. Saitz R. Introduction to alcohol withdrawal. Alcohol Health Res World. 1998;22(1):5-12.
4. Center for Behavioral Health Statistics and Quality [Internet]. Rockville: SAMHSA [cited 2023 Dec 8]. Table 5.9A—Alcohol use disorder in past year: among people aged 12 or older; by age group and demographic characteristics, numbers in thousands 2021 and 2022; [about 2 screens]. Available from: https://www.samhsa.gov/data/sites/default/files/reports/rpt42728/NSDUHDetailedTabs2022/NSDUHDetailedTabs2022/NSDUHDetTabsSect5pe2022.htm#tab5.9a
5. Kosten TR, O'Connor PG. Management of drug and alcohol withdrawal. N Engl J Med. 2003;348(18):1786-95. DOI: 10.1056/NEJMra020617
6. Steel TL, Malte CA, Bradley KA, Lokhandwala S, Hough CL, Hawkins EJ. Prevalence and variation of clinically recognized inpatient alcohol withdrawal syndrome in the Veterans Health Administration. J Addict Med. 2020;14(4):300-4. DOI: 10.1097/ADM.0000000000000576
7. The ASAM Clinical Practice Guideline on Alcohol Withdrawal Management. J Addict Med. 2020 May/Jun;14(3S Suppl 1):1-72. DOI: 10.1097/ADM.0000000000000668. Erratum in: J Addict Med. 2020 Sep/Oct;14(5):e280. DOI: 10.1097/ADM.0000000000000731
8. Dyal S, MacLaren R. The assessment and management practices of acute alcohol withdrawal: results of a nationwide survey of critical care pharmacists. Hosp Pharm. 2019;54(1):22-31. DOI: 10.1177/0018578718769241
9. Hecksel KA, Bostwick JM, Jaeger TM, Cha SS. Inappropriate use of symptom-triggered therapy for alcohol withdrawal in the general hospital. Mayo Clin Proc. 2008;83(3):274-9. DOI: 10.4065/83.3.274
10. Bacon O, Robert S, VandenBerg A. Evaluating nursing satisfaction and utilization of the Clinical Institute Withdrawal Assessment for Alcohol, revised version (CIWA-Ar). Ment Heal Clin. 2016;6(3):114-9. DOI: 10.9740/mhc.2016.05.114
11. DeCarolis DD, Rice KL, Ho L, Willenbring ML, Cassaro S. Symptom-driven lorazepam protocol for treatment of severe alcohol withdrawal delirium in the intensive care unit. Pharmacother J Hum Pharmacol Drug Ther. 2007;27(4):510-8. DOI: 10.1592/phco.27.4.510
12. Heavner JJ, Akgün KM, Heavner MS, et al. Implementation of an ICU-specific alcohol withdrawal syndrome management protocol reduces the need for mechanical ventilation. Pharmacother J Hum Pharmacol Drug Ther. 2018;38(7):701-13. DOI: 10.1002/phar.2127
13. Bradley M, Kiser TH, Mueller SW, Reynolds PM, MacLaren R. Correlation between and nursing satisfaction with CIWA-Ar, mMINDS, and SEWS scoring tools for the assessment of severe alcohol withdrawal syndrome in ICU patients. Ann Pharmacother. 2023;57(2):175-83. DOI: 10.1177/10600280221102562
14. Krcmarik KM, Hulley BJ, Huang J, et al. Assessment of a modified MINDS -based protocol for management of alcohol withdrawal syndrome on an inpatient medical service. Pharmacother J Hum Pharmacol Drug Ther. 2023;43(12):1297-306. DOI: 10.1002/phar.2855
15. Wetterling T, Kanitz RD, Besters B, Fischer D, Zerfass D, john U, et al. A new rating scale for the assessment of the Alcohol-Withdrawal Syndrome (AWS Scale). Alcohol Alcohol. 1997;32(6):753-60. DOI: 10.1093/oxfordjournals.alcalc.a008326
16. Murphy SN, Weber G, Mendis M, Gainer V, Chueh HC, Churchill S, et al. Serving the enterprise and beyond with informatics for integrating biology and the bedside (i2b2). J Am Med Inform Assoc. 2010;17(2):124-30. DOI: 10.1136/jamia.2009.000893
17. Waitman LR, Warren JJ, Manos EL, Connolly DW. Expressing observations from electronic medical record flowsheets in an i2b2 based clinical data repository to support research and quality

improvement. AMIA Annu Symp Proc. 2011;2011:1454-63. PMID: 22195209
18. Smith JT, Sage M, Szeto H, et al. Outcomes after implementation of a benzodiazepine-sparing alcohol withdrawal order set in an integrated health care system. JAMA Netw Open. 2022;5(2):e220158. DOI: 10.1001/jamanetworkopen.2022.0158
19. Edinoff AN, Nix CA, Hollier J, Sagrera CE, Delacroix BM, Abubakar T, et al. Benzodiazepines: uses, dangers, and clinical considerations. Neurol Int. 2021;13(4):594-607. DOI: 10.3390/neurolint13040059
20. Unlu H, Macaron MM, Ayraler Taner H, et al. Sex difference in alcohol withdrawal syndrome: a scoping review of clinical studies. Front Psychiatry. 2023;14. DOI: 10.3389/fpsyt.2023.1266424
21. Wojnar M, Wasilewski D, Matsumoto H, Cedro A. Differences in the course of alcohol withdrawal in women and men: a Polish sample. Alcohol Clin Exp Res. 1997;21(8):1351-5. PMID: 9394103
22. Canales FJ, Davis J, Girgla N, Emami M, Cooper T, Carlson RW. Alcohol withdrawal syndrome in women vs men: analysis of 1496 cases at a single site. Am J Crit Care. 2022;31(3):212-9. DOI: 10.4037/ajcc2022616