Outcomes of Standardized Minnesota Detoxification Scale (MINDS) Assessment with High Dose Diazepam Treatment for Alcohol Withdrawal in Hospitalized Patients

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BACKGROUND

- 1.6 million men and 800,000 women in the US are alcohol dependent and have an alcohol-use disorder
- Half will experience withdrawal symptoms after decreased alcohol consumption[1]
- Complications including seizures and delirium tremens occur in 3-5%[2]
- Benzodiazepines are the gold standard for treatment of alcohol withdrawal[3,4]
- Choice of drug regimens by physicians varies widely within the same hospital and protocol use[5]
- Systematic treatment of alcohol withdrawal is needed to accurately evaluate patients' outcomes

INTERVENTION

- In 2013, at a 12-hospital system in Minnesota, a symptom-based detoxification scale assessment tool (MINDS) and a single standardized high dose, diazepam-based treatment protocol (loading dose up to 80 mg diazepam) was initiated for alcohol withdrawal patients

GOAL OF STUDY

- To assess whether implementation of the standardized MINDS protocol order set for diagnosis and treatment of acute alcohol withdrawal resulted in a meaningful, measurable improvement in patient outcomes.

METHODS

- Patient outcomes were assessed for MINDS use compared to use of older protocols administering lower initial benzodiazepine equivalents to diazepam doses (Pre-MINDS).
- Retrospective data were collected from two groups of patients:
  - the MINDS group from 2016 – 2017 (n = 2308)
  - the Pre-MINDS group from 2014 – 2015 (n = 1364)
- Inclusion criteria:
  - Adult patients with an ICD-9 diagnosis of alcohol dependence or acute alcohol withdrawal
  - Use of an order set for an alcohol withdrawal symptom assessment protocol
  - Administration of any benzodiazepine
- Exclusion criteria:
  - Age < 18 years old
  - A known allergy to benzodiazepines
  - Pregnancy

DATA ANALYSIS

- Chi-square and two-sample t-tests
- Multivariable linear and logistic regression

Table 1. Characteristics of patients who received the MINDS treatment protocol in 2016 – 2017 compared to those who received older treatment protocols (Pre-MINDS) in 2014 – 2015.

Variables	Pre-MINDS Years 2014 - 2015	MINDS Years 2016 - 2017	p-values
Demographics			
Number of patients (n)	1364	2308	
Median age in years, (IQR)	50 (38 - 58)	45* (34 - 54)	< 0.0001
Female, n (%)	461 (33.8%)	763 (33.1%)	0.67
Race*, n (%):			< 0.0001
White	1172 (85.9%)	2083 (90.3%)	
African American	95 (7.0%)	114 (4.9%)	
Asian	8 (0.6%)	1 (0.04%)	
Native Hawaiian/Pacific Islander	1 (0.1%)	7 (0.3%)	
American Indian/Alaska Native	71 (5.2%)	69 (3.0%)	
Married, n (%)	351 (25.7%)	488* (21.1%)	0.0016
Insurance Coverage*, n (%):			< 0.0001
Private	520 (38.1%)	1091 (44.2%)	
Government sponsored	704 (51.6%)	1111 (48.1%)	
Other	31 (2.3%)	45 (1.9%)	
Unadjusted Outcomes			
Length of stay	5.6	3.3*	< 0.0001
All-cause 30-day mortality, n (%)	15 (1.1%)	9* (0.4%)	0.02
Inpatient mortality, n (%)	11 (0.8%)	5* (0.2%)	0.02
Use of restraints, n (%)	171 (12.5%)	96* (4.2%)	< 0.0001
Discharge to home (%)	73.8	56.2*	< 0.0001

*Two-sample independent and Chi-square tests were conducted to compare the variables between MINDS and Pre-MINDS groups. *Significant differences between the groups.*

Other variables that were evaluated but not shown because there were insignificant differences were spoken language in home, body mass index, heart rate, severity of illness, and risk of mortality from hospital admission.

Table 2. Association of use of the MINDS intervention with dependent variables (length of stay, readmissions, mortality, use of restraints, and discharge disposition) using linear and logistic regression models, n = 3,672 total patients.

Variables	Values	95% Confidence Intervals	p-values
Coefficient			
Length of stay	-0.85	[-1.24, -0.45]	< 0.0001*
Total diazepam equivalent dose	29.16	[24.23, 53.81]	< 0.0001*
Duration of total diazepam equivalent dose	-0.65	[-0.9, -0.40]	< 0.0001*
AOR			
Use of restraints	0.43	[0.31, 0.60]	< 0.0001#
Transfer into ICU	0.53	[0.41, 0.68]	< 0.0001#
30-day all-cause readmissions	0.82	[0.67, 1.00]	0.05#
30-day ED readmissions	1.06	[0.83, 1.34]	0.66
All-cause 30-day mortality	1.74	[0.62, 4.91]	0.29
All-case inpatient mortality	1.59	[0.29, 8.66]	0.59
Discharge to home	0.98	[0.80, 1.21]	0.87
Discharge to facility	0.10	[0.81, 1.22]	0.97

**Significant difference between use of MINDS and pre-MINDS protocols using multivariable linear regression.*

#Significant difference between use of MINDS and pre-MINDS protocols using logistic regression, AOR = Adjusted Odds Ratio.

The linear and logistic regression models were controlled for the following variables: age in years, gender, race, marital status, spoken language in home, body mass index, heart rate, insurance category, severity of illness, and risk of mortality from time of hospital admission until hospital discharge. Significance was determined at p ≤ 0.05.

RESULTS

- MINDS patients were younger and fewer were married than Pre-MINDS patients
- Differences existed for race and insurance coverage (p < 0.001, Table 1)
- The estimated mean LOS was 0.85 days significantly shorter for MINDS patients than for Pre-MINDS patients after adjusting for other variables (Table 2)
- The mean unadjusted total diazepam equivalent oral dose for pre-MINDS patients was 118mg versus 122 mg for MINDS patients
- After adjusting for other variables, the estimated mean total diazepam equivalent oral dose administered was 29 mg significantly higher for MINDS patients than for Pre-MINDS patients (p < 0.0001, Table 2)
- For the entire LOS, the duration of the estimated mean total diazepam equivalent oral dose was 0.7 days significantly shorter for MINDS patients than for pre-MINDS patients after adjusting for other variables (p < 0.0001, Table 2)
- MINDS patients were significantly less likely to require the use of restraints (AOR = 0.43, CI = 0.31, 0.60)
- MINDS patients were less likely to be transferred into the intensive care unit (ICU) (AOR = 0.53, CI = 0.41, 0.68)
- MINDS patients had significantly fewer 30-day all-cause readmissions than Pre-MINDS patients after adjusting for other variables (AOR = 0.82, CI = 0.67, 1.00)
- MINDS patients transferred into the ICU had a shorter ICU LOS than Pre-MINDS patients but the difference was not statistically significant
- After adjusting for other variables, both groups had similar outcomes for:
  - emergency department readmissions
  - 30-day all-cause mortality
  - all-cause inpatient mortality
  - discharge location

CONCLUSIONS

- Outcomes for alcohol withdrawal patients were improved by use of the MINDS novel symptom-based assessment tool and a single high dose diazepam-based treatment protocol
- Patients experienced significantly decreased LOS, use of restraints, transfer into the ICU, and 30-day all-cause readmissions compared to use of multiple older protocols without adversely impacting mortality
- This standardized treatment approach can be used to safely and effectively improve patient outcomes

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