Acute and Critical Care

Acute and Critical Care 2023 February 38(1):122-133
https://doi.org/10.4266/acc.2022.00584

| pISSN 2586-6052 | eISSN 2586-6060

Alcohol use disorder in the intensive care unit a highly morbid condition, but chemical dependency discussion improves outcomes

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Background: Alcohol use disorders (AUD) are common in patients admitted to intensive care units (ICU) and increase the risk for worse outcomes. In this study, we describe factors associated with patient mortality after ICU admission and the effect of chemical dependency (CD) counseling on outcomes in the year following ICU admission.

Methods: We retrospectively reviewed patient demographics, hospital data, and documentation of CD counseling by medical providers for all ICU patients with AUD admitted to our institution between January 2017 and March 2019. Primary outcomes were in-hospital and 1-year mortality.

Results: Of the 527 patients with AUD requiring ICU care, median age was 56 years (range, 18–86). Both in-hospital (12%) and 1-year mortality rates (27%) were high. Rural patients, comorbidities, older age, need for mechanical ventilation, and complications were associated with increased risk of in-hospital and 1-year mortality. CD counseling was documented for 73% of patients, and 50% of these patients accepted alcohol treatment or resources prior to discharge. CD evaluation and acceptance was associated with a significantly decreased rate of readmission for liver or alcohol-related issues (36% vs. 58%; odds ratio [OR], 0.41; 95% confidence interval [CI], 0.27–0.61) and 1-year mortality (7% vs. 19.5%; OR, 0.32; 95% CI, 0.16–0.64). CD evaluation alone, regardless of patient acceptance, was associated with a significantly decreased 1-year post-discharge mortality rate (12% vs. 23%; OR, 0.44; 95% CI, 0.25–0.77).

Conclusions: ICU patients with AUD had high in-hospital and 1-year mortality. CD evaluation, regardless of patient acceptance, was associated with a significant decrease in 1-year mortality.

Key Words: alcoholism; counseling; critical illness; intensive care units; mortality; outcomes

Original Article

Received: April 26, 2022
Revised: September 22, 2022
Accepted: September 23, 2022

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INTRODUCTION

Alcohol is the most used drug in the United States, with 50% of the population reported using alcohol in the past month according to the 2020 National Survey on Drug Use and Health [1]. Alcohol is also the most abused drug. Of the 138 million current alcohol users in the United States, 61 million reported binge drinking in the past month and 28 million, or 10% of the

population, met criteria for alcohol use disorder (AUD) in the past year [1]. Alcohol use and abuse is associated with numerous detrimental physical and mental health effects [2], and between 2011 and 2015, excessive drinking was responsible for 261 deaths per day [3]. Harmful alcohol use is the third leading cause of preventable death in the United States [4]. In addition, alcohol abuse and its consequences are costly. In 2006, the estimated hospital costs for treatment of alcohol-related issues exceeded $5 billion, but the total estimated economic cost of excessive drinking exceeded $220 billion [5].

Alcohol abuse impacts individuals' perception of the problem and ability to obtain treatment when needed. The vast majority of individuals with substance abuse disorder do not feel that they need treatment, with only 2.5% of people with substance abuse disorder perceiving a need for treatment [1]. In trauma patients, a formal discussion with their medical providers about their alcohol use, screening for alcohol abuse, and a discussion of how their alcohol use contributed to their injury has been shown to significantly decrease recidivism in these patients for traumatic injury associated with alcohol use [6,7]. The acuity and direct correlation of the two problems (alcohol use and their injury) has been hypothesized to be a "teachable moment" with greater chance of initiation of change [8].

Alcohol abuse that leads to an intensive care unit (ICU) admission is another opportunity for medical providers to use the life-threatening medical problem to help patients with AUD recognize the issue and may be an impetus for seeking treatment or behavioral change. In this study, we describe the patient population admitted to a tertiary referral center ICU serving a large, rural area, including risk factors associated with worse outcomes in patients with AUD and evaluating the effect of chemical dependency (CD) referral and evaluation.

KEY MESSAGES

- Alcohol use disorder associated with critical illness continues to be associated with high mortality rates in the hospital and in the year after admission.
- Providers caring for patients with alcohol use disorder should be aware of the increased risk of complications and mortality, to mitigate this risk when possible and guide goals of care discussions.
- Provider-initiated chemical dependency counseling during the index admission for their critical illness, was associated with decreased 1-year mortality rates and readmissions.

MATERIALS AND METHODS

We performed a retrospective review of patients admitted to an ICU in our Level 1 Trauma Center located in Northern Minnesota, in the upper Midwest of the United States serving a large rural area between January 1, 2017 and March 31, 2019. Patients with documented AUD (alcoholism, alcohol dependence, and alcohol abuse) were included in the study group. All patient's charts were reviewed to ensure that they had an alcohol use history consistent with an AUD. Patients with only social alcohol use and those who opted out of research with the healthcare system were excluded. In addition, patient chart and ICU stays were reviewed, and any patient that was admitted to the ICU only for monitoring and who did not require intensive care of for least 48 hours was excluded. Intensive care was defined as a need for continuous intravenous medications requiring at least hourly titration by an ICU nurse, mechanical ventilation, or evidence of at least one ICU treated organ failure. This study was reviewed, monitored, and approved by the Institutional Review Board of Essentia Institute of Rural Health, Duluth, MN, USA (No. EH20653). Patient consent was waived for this study.

After the study cohort was identified and electronically abstracted, manual chart review was performed for all patients by the first author (KC). All patient demographics, including age, sex recorded at birth, self-identified race, marital status, and insurance type were recorded. Current or former use of tobacco or other drugs of abuse was collected, as well as if the patient was still drinking alcohol prior to admission. ICU and hospital data were recorded for all patients, including primary reason for admission, hospital and ICU length of stay, use of mechanical ventilation or non-invasive ventilation, and complications that occurred during the hospital stay. Complications were included in analysis as a composite variable of any complication during the hospital admission, as well as by individual complication type (alcohol withdrawal, infection, septic shock, organ failure, acute respiratory distress syndrome, thrombotic complications or bleeding complications). ICU type was defined not by the physical location, but by the primary intensivist team (medical critical team or surgical/trauma critical care team). All critical care physicians at our hospital are board certified in critical care. Trauma ICU and surgical ICU were defined as cared for by the surgical/trauma critical care team and then patients' reason for admission. If

admitted due to injury, the patient was classified as trauma ICU. If not injured, they were defined as surgical ICU. Manual chart review was performed of all in-patient documentation by the medical provider for documented discussion of alcohol-related CD evaluation and counseling regarding the health and quality of life benefits of alcohol cessation. If CD evaluation and counseling was documented as being performed, the chart was then reviewed for documentation of patient acceptance of further support, referrals, or a verbal willingness to quit. This provider-initiated CD counseling was performed once the patient was recovering from their critical illness and most occurred outside of the ICU. In-hospital and 1-year mortality, and 6-month post-discharge readmissions due to alcohol abuse or its complications were also documented.

Statistical analysis was performed using IBM SPSS version 26.0 (IBM Corp.). Descriptive analysis was performed for the cohort, as well as comparing outcome variables. Primary outcome variables were in-hospital mortality, 1-year post-discharge mortality, and 6-month post-discharge readmission. Variables were compared using chi-square tests for categorical variables, and Mann-Whitney *U*-tests for continuous, non-normally distributed variables. Binary logistic regression was used for multi-variate analysis, which controlled for patient age, sex, and any variables associated with the outcome variable in univariate regression analyses. P-values of less than 0.05 were considered statistically significant.

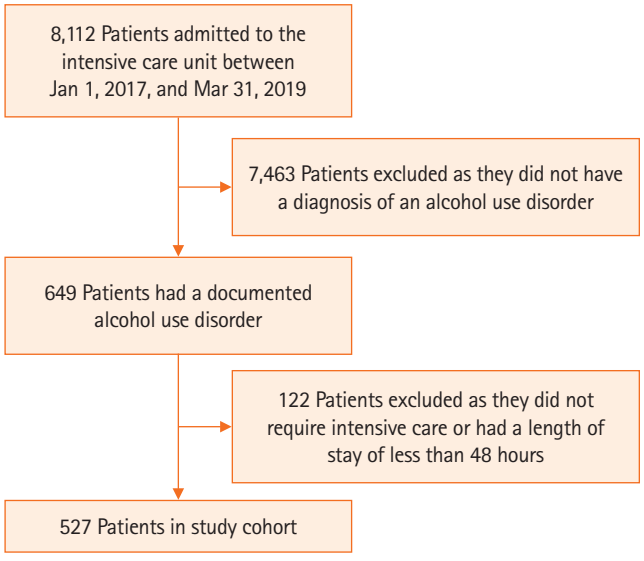

Figure 1. Flowchart of patient inclusion and exclusion.

RESULTS

During the study period, 649 patients were admitted to our ICU with a diagnosis associated with AUD, which accounted for 8% of ICU admissions during the time period. Upon chart review, 122 patients were excluded as they did not require ICU care or had an ICU length of stay less than 48 hours, leaving 527 patients in our cohort (Figure 1). Patient demographics are described in Table 1. There was a wide age range, from 18 to

Table 1. Patient demographics for all patients with alcohol abuse admitted for intensive care

Variable	No. of patients (%) (n=527)
Age (yr)[a]	56 (18–86)
Age <65 yr	121 (23)
Sex	
Female	160 (30)
Male	367 (70)
Race	
White	418 (79)
Black	11 (2)
American Indian/Alaska native	88 (17)
Asian/Hawaiian/Pacific islander	6 (1)
Unknown	4 (0.7)
Rural	189 (36)
Insurance	
Uninsured	115 (21)
Private	71 (14)
Medicare	156 (29)
Medicaid	185 (36)
Comorbidity	
Liver failure	241 (46)
Diabetes mellitus	111 (21)
Cancer	52 (10)
Chronic renal disease	85 (16)
Cardiac disease	311 (60)
Chronic respiratory disease	154 (29)
Thrombocytopenia	194 (37)
Mental health diagnosis	307 (58)
Two or more comorbidities	424 (80)
Still drinking prior to admission	463 (88)
Tobacco use[b]	
Current	322 (61)
Former	121 (23)
Never	83 (16)
Other drug use[b]	
Current	100 (19)
Former	23 (4)
Never	401 (77)

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Table 1. Continued

Variable	No. of patients (%) (n=527)
ICU care type	
Medical ICU	396 (75)
Trauma ICU	89 (17)
Surgical ICU	42 (8)
Intubated during admission	263 (50)
Blood transfused during admission	115 (22)
ICU length of stay (day)[c]	3 (2–6)
Hospital length of stay (day)[c]	8 (4–13)
Complication during hospital stay	428 (81)
Discharge disposition[b]	
Home	267 (51)
Skilled nursing	72 (14)
Acute rehab	36 (7)
Inpatient mental health treatment	46 (9)
Other hospital	6 (1)
Against medical advice	15 (3)
Hospice	20 (4)
In-hospital mortality	63 (12)
1-Year mortality	144 (27)
6-Month readmission for alcohol or liver related issue	239 (48)

ICU: intensive care unit.
a) Median (range); b) Some values were missing for these variables; c) Median (interquartile range).

86 years. Median age was 56 years. Seventy percent of patients were male, and the majority were Caucasian, followed by American Indian/Alaska native, Black, and Asian/Native Hawaiian/Pacific islander. Over a one third of patients were from rural localities, 80% had two or more comorbidities, and 46% had liver failure or cirrhosis diagnosed prior to their admission. Even with the high number of patients with existing liver failure/cirrhosis, most patients (88%) were still drinking just prior to their admission. Of the 241 patients with liver failure/cirrhosis diagnosed prior to admission, 40% were still drinking.

The primary reason for admission varied as depicted in Figure 2. ICU care was performed in medical ICUs three-quarters of the time, followed by trauma then surgical ICU. The median ICU length of stay was 3 days, and the median hospital length of stay was 8 days. Most patients had at least one complication during their hospital stay (81%) (Figure 3). The most common complications were symptomatic alcohol withdrawal, infections, and bleeding. Compared to patients who did not have complications, patients with complications had significantly longer hospital stays (median: 9 days; interquartile range [IQR]: 5–14 vs. 4 days [2–7]) and ICU stays (median [IQR]: 4 days [2–7] vs. 2 days [2–3]). Approximately half of patients were discharged to home, followed by discharge to skilled nursing or acute rehab. Nine percent were discharged to inpatient

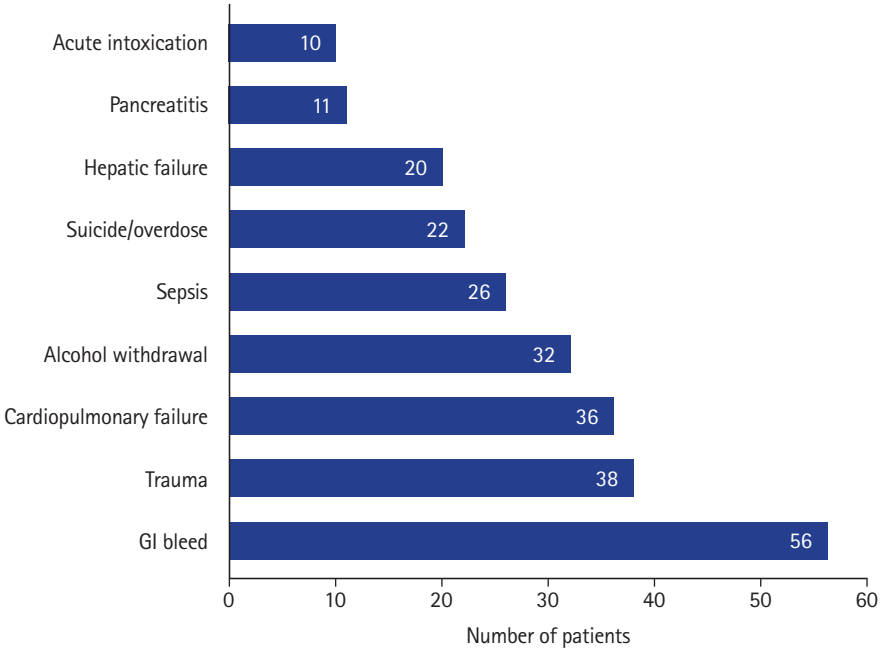

Figure 2. Primary reason for admission to the intensive care unit for patients with alcohol use disorder or alcoholic liver failure. GI: gastrointestinal.

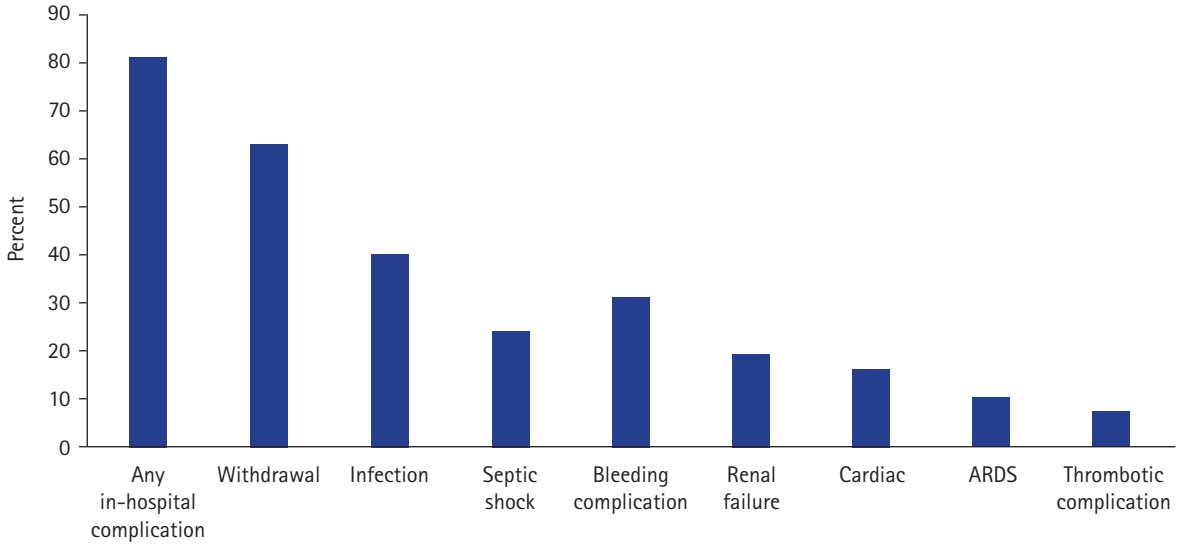

Figure 3. Complications during the hospital stay in patients with alcohol use disorder or alcoholic liver failure. In-hospital complications is reported as a composite variable (any patient that had one or more of the subcategories of complications listed) and as individual complications. ARDS: acute respiratory distress syndrome.

mental health treatment and 12% of patients died during their hospital stay. In our cohort of ICU patients with severe AUD, almost one third died within a year of ICU admission based on available mortality data.

Mortality

Table 2 depicts patient and hospital variables and their association with in-hospital mortality and 1-year mortality. Patients who died in the hospital were significantly older (median age [IQR]: 59 years [50–67] vs. 55 years [44–63]; P=0.008). Patients who died in the hospital also had longer ICU stays (median age [IQR]: 6 days [3–10] vs. 3 days [2–5]; P<0.001). There was no statistically significant difference in total hospital length of stay.

To better clarify independent risk factors associated with in-hospital mortality, a binary logistic regression was performed controlling for patient age, sex, number of comorbidities, and including risk factors for inpatient mortality identified as statistically significant in univariate regression analyses (rurality, cirrhosis or liver failure prior to admission, need for mechanical ventilation, and in-hospital complications). Figure 4 details the adjusted odds ratio (OR) and 95% confidence interval (CI) for each variable in this model. There was an independently associated increased risk of death for each additional comorbidity, liver failure and respiratory failure. The model had a Hosmer and Lemeshow test P-value of 0.97. For patients with pre-existing liver failure or cirrhosis, in-hospital mortality was significantly higher for Child-Pugh class C (A=15%, B=14%, C=37%; P<0.001). Model for end-stage liver disease (MELD) scores for patients that died were significantly higher than those that survived their hospital stay (median [IQR]: 26 [15–34] vs. 8 [12–24]; P<0.001).

Mortality within 1 year of ICU admission was high, with 27% of all patients admitted to the ICU with AUD dying within 1 year. Sixty-three patients died in the hospital, and 81 patients of the 464 patients who survived discharge died in the year after admission. One-year mortality rates were higher in females, older patients, and rural patients (Table 2). Increased number of comorbidities was also associated with higher rates of 1-year mortality. Patients with pre-existing liver disease or cirrhosis had a 1-year mortality rate of 47%. In patients with liver failure prior to admission, patients with a Child-Pugh Score C had a 65% 1-year mortality rate, compared to Child-Pugh scores of A or B (35%, P<0.001). MELD score was also associated with risk of 1-year mortality (median [IQR]: 1-year mortality group, 23 [16–30] vs. survivor, 17 [12–23]; P<0.001).

In addition to high risk of mortality, our cohort had a high readmission rate within 6 months of their index ICU admission (Table 3). Of the 464 patients that survived to discharge after their ICU admission, 48% were readmitted. Although most of our cohort was male, females were significantly more likely to be readmitted. Patient with liver failure/cirrhosis diagnosed prior to their ICU admission (OR,1.99; 95% CI, 1.37–2.91) had significantly higher odds of being readmitted. Patients that

Table 2. Mortality rate by patient and hospital stay variables

Variable	In-hospital mortality (%)[a]	P-value	1-Year mortality (%)[b]	P-value
Female	14	0.26	33	0.05
Age ≥65 yr	16	0.14	39	<0.001
Race		0.64		0.81
White	12		27	
Black	0		18	
American Indian/Alaska native	11		30	
Asian/Hawaiian/Pacific islander	10		20	
Unknown	0		0	
Rural	16	0.04	35	0.01
Insurance status		0.02		<0.001
Uninsured	9		30	
Private insurance	7		16	
Medicare	19		38	
Medicaid	10		21	
Comorbidity				
Liver failure	23	<0.001	47	<0.001
Diabetes mellitus	15	0.22	36	0.02
Cancer	23	0.01	52	<0.001
Chronic renal disease	24	<0.001	45	<0.001
Cardiac disease	15	0.01	32	0.01
Chronic respiratory disease	19	0.01	39	<0.001
Thrombocytopenia	22	<0.001	40	<0.001
Mental health diagnosis	14	0.15	27	0.86
Two or more comorbidities	15	<0.001	32	<0.001
Still drinking	11	0.01	24	<0.001
Current tobacco use	12	0.99	26	0.43
ICU type		0.52		0.01
Medical	13		30	
Surgical	10		29	
Neurotrauma	9		15	
Mechanical ventilation	21	<0.001	32	0.02
Complication in the Hospital	15	<0.001	31	<0.001
Alcohol withdrawal	9	0.01	21	<0.001
Septic shock	38	<0.001	55	<0.001
Cardiac complication	36	<0.001	52	<0.001
Renal failure	34	<0.001	55	<0.001
ARDS	49	<0.001	69	<0.001
Thrombosis	19	0.02	47	0.04
Received blood transfusion	17	0.04	37	0.01

ICU: intensive care unit; ARDS: acute respiratory distress syndrome.
a) n=63 (12%); b) n=144 (27%).

were readmitted had significantly higher odds of dying within the year after their ICU admission compared to those who were not readmitted (OR, 2.68; 95% CI, 1.60–4.50).

Effects of Provider-Initiated CD Discussions

To evaluate the effect of provider-initiated CD discussion regarding their alcohol abuse and its effect on their health, we evaluated the subset of patients in our cohort who were still drinking prior to admission and survived to discharge.

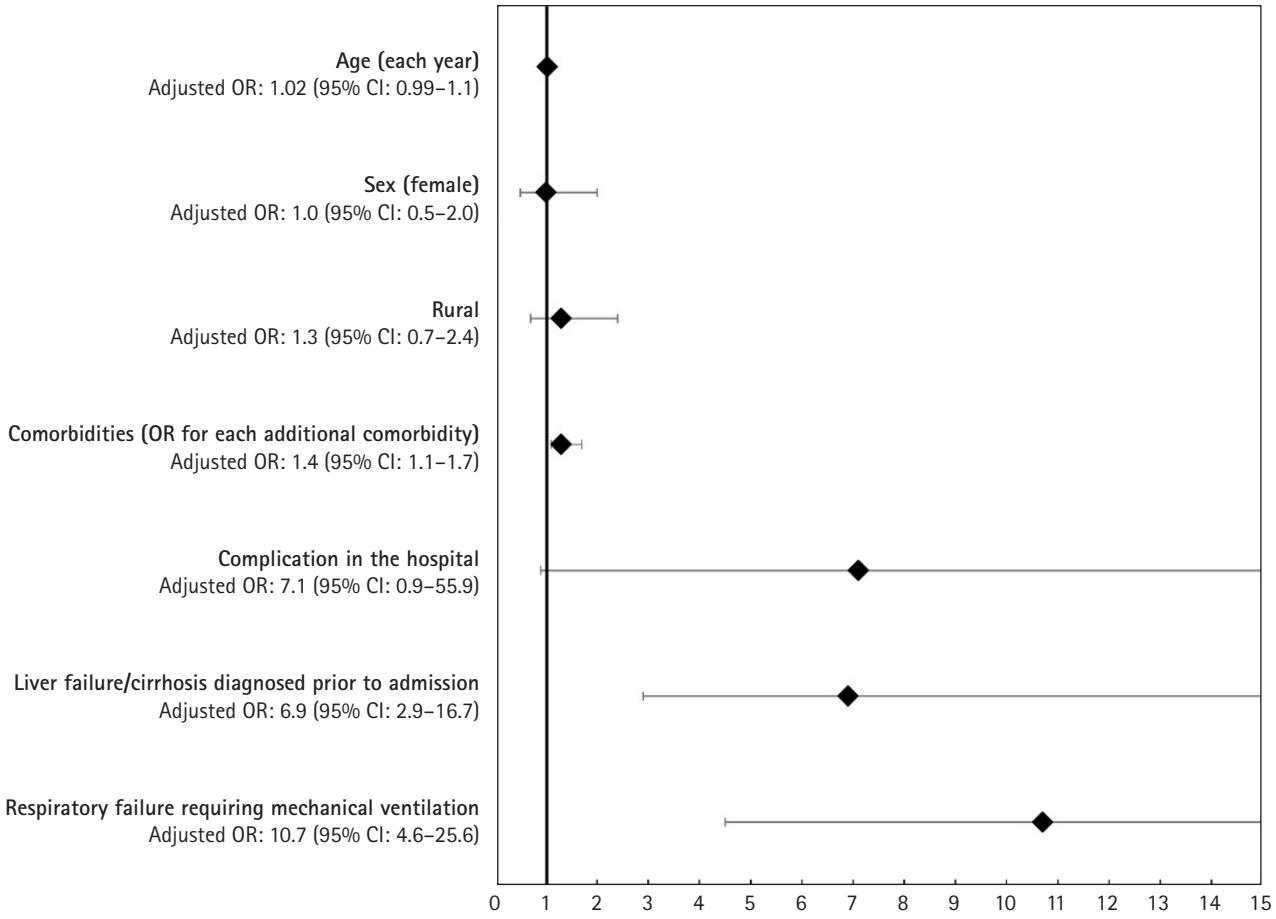

Figure 4. Forest plot depicting the adjusted odds ratio (OR) for in-hospital mortality and patient or hospital-stay associated factors using logistic regression. Comorbidities, liver failure, and need for mechanical ventilation were independently associated with risk of in-hospital death. CI: confidence interval.

Sixty-four patients had complete alcohol cessation prior to admission and 103 patients died in the hospital, leaving 414 patients in this subgroup analysis. A total of 303 patients (73%) had a documented CD discussion by a provider. Table 4 describes the patient and hospital-level factors associated with CD evaluation. Older patients, as well as those with Medicare insurance, longer hospital stays, admissions with sepsis, and with more comorbidities were less likely to have a CD evaluation during their stay. Hospital length of stay was longer in patients that did not receive CD evaluation, but ICU stay was not different and there was no significant difference in the rate of complications. Of the 303 patients that received CD evaluation, 153 (50%) accepted CD support and information on alcohol cessation and voiced a desire to quit. CD evaluation and acceptance was associated with a significantly decreased rates of readmission for liver or alcohol related issues (36% vs. 58%; OR, 0.41; 95% CI, 0.27–0.61) and significantly decreased rates of 1-year mortality (7% vs. 19.5%; OR, 0.32; 95% CI, 0.16–0.64). CD evaluation alone, regardless of patient acceptance, was associated with a nonsignificant decreased rate and odds of readmission for alcohol or liver issues in the next 6 months (48% vs. 57%; OR, 0.68; 95% CI, 0.43–1.05), and with a significantly decreased rate in mortality 1-year after admission (12% vs. 23%; OR, 0.44; 95% CI, 0.25–0.77).

DISCUSSION

In this large, retrospective cohort study based in a predominately rural area of the Upper Midwest of the United States, we found that ICU admission in patients with alcohol abuse is common and associated with high morbidity and mortality.

Alcohol abuse was identified in approximately 8% of ICU admissions at our hospital, which is similar to other studies, where alcohol abuse has been associated with 7%–34% of

Table 3. Patient and hospitalization variables associated with 6-month readmissions related to alcohol use

Variable	6-Month readmission rate (%)[a]	P-value
Female	58	0.04
Age ≥65 yr	46	0.25
Self-reported race		0.47
White	49	
Black	64	
American Indian/Alaska native	58	
Asian/Pacific islander	56	
Rural	48	0.31
Insurance status		<0.001
Uninsured	67	
Private insurance	36	
Medicare	53	
Medicaid	46	
Comorbidity		
Diabetes	45	0.16
Chronic renal disease	60	0.15
Cancer	53	0.85
Cardiac disease	52	0.76
Chronic respiratory disease	50	0.70
Thrombocytopenia	51	0.31
Mental health disorder	52	0.62
Cirrhosis/liver failure	61	<0.001
Two or more comorbidities	53	0.10
Still drinking prior to admission	50	0.18
Current tobacco use	50	0.78
Intubated during hospital stay	44	0.01
Complication in the hospital	55	0.01
Alcohol withdrawal	54	0.59
Septic shock	41	0.12
Cardiac complication	47	0.55
Renal failure	57	0.31
ARDS	39	0.19
Thrombotic complication	62	0.22
Received blood transfusion	59	0.09

ARDS: acute respiratory distress syndrome.
a) n=239 (48%).

ICU admission [9-15]. Death during the index hospitalization was common, with 12% of patients dying during their hospital stay. This is similar to other studies that have evaluated alcohol dependence or abuse in ICU patients, which have reported mortality rates between 9%–30% [9-16]. In addition to high mortality in the hospital, we found these patients are at significant risk for death within a year of their admission. Specifically, 27% of the patients in our study died within a year of their admission. Christensen et al. reported that patients admitted to the ICU for issues related to alcohol abuse with any chronic complications had an increased risk of death that continued for 3 years after their initial admission [17]. Patients with alcoholic liver disease or cirrhosis were at the highest risk of death in our study, with a 23% in-hospital mortality rate and a 47% 1-year mortality rate. Mortality rates for patients with liver cirrhosis admitted to the ICU have ranged from 18%–100% in other studies [18-26]. While in-hospital mortality has been decreasing in more recent studies to rates more in line with our findings, long-term mortality rates remain high for patients with liver disease who require ICU admission [24,27,28]. Improvements in supportive care can resolve the acute illness, but long-term treatments for liver failure are still lacking. Liver dysfunction has been associated with impaired immune functioning, higher risk of bleeding, increased rates and worse outcomes in acute respiratory distress syndrome, and changes in metabolism and nutrition, which may account for the increased risk of mortality in these patients during and after acute illness [29-35].

Other risk factors for increased mortality in patients with AUD in our study included increased comorbidities at time of admission, need for mechanical ventilation, complications during the hospital stay, and need for blood transfusions. These findings are similar to other risk factors for death in all patients needing ICU care. In addition, we found that rural patients had significantly increased rates of in-hospital and 1-year mortality when compared to non-rural patients. Alcohol use in rural communities varies by region; however, current AUD has a lower prevalence in suburban areas (11%) compared to urban areas (14%) and is highest in rural areas (15%) [36]. Rural patients also tend to have higher rates of comorbidities and may have less access to preventive health care. In our study, while men accounted for the majority of patients, female sex was associated with an increased risk of death within a year of ICU admission.

We found that in addition to the high risk of mortality, patients with alcohol abuse admitted to the ICU required significant resource utilization. ICU and hospital lengths of stay were long, and 80% of patients had a complication during their hospital stay, and the vast majority required intubation during their stay, leading to high resource utilization in this patient group. Cervellione et al. [37] evaluated ICU resource utilization in patients with drug and alcohol abuse and reported similar hospital and ICU lengths of stay (median: hospital length of stay, 6 days; ICU length of stay, 3 days). They also found that

Table 4. Patient and admission variables associated with alcohol chemical dependency counseling

Variable	All patients (n=414)	CD evaluation (n= 303)	No CD evaluation (n=111)	P-value
Age[a] (yr)	54 (18–83)	51 (18–76)	60 (27–83)	<0.001
Female	120 (29)	85 (28)	35 (32)	0.49
Race				0.52
White	324 (78)	240 (79)	84 (76)	
Black	11 (3)	6 (2)	5 (5)	
American Indian/Alaska native	50 (17)	50 (17)	20 (18)	
Rural	138 (33)	99 (33)	39 (35)	0.64
Insurance				<0.001
Uninsured	78 (20)	62 (22)	16 (15)	
Private	62 (15)	52 (18)	10 (9)	
Medicare	100 (25)	57 (19)	43 (40)	
Medicaid	157 (39)	118 (41)	39 (36)	
ICU length of stay[b] (day)	3 (2–5)	3 (2–5)	3 (2–8)	0.24
Hospital length of stay[b] (day)	8 (4–13)	7 (4–12)	9 (5–17)	0.01
Comorbidity				
Diabetes mellitus	78 (18)	48 (16)	28 (25)	0.03
Chronic renal disease	46 (11)	23 (8)	23 (21)	<0.001
Cancer	28 (7)	16 (5)	12 (11)	0.05
Cirrhosis	73 (25)	55 (26)	18 (22)	0.50
Cardiac disease	230 (56)	146 (48)	84 (76)	<0.001
Chronic respiratory disease	109 (26)	62 (21)	47 (42)	<0.001
Thrombocytopenia	119 (29)	79 (26)	40 (36)	0.05
Psychiatric diagnosis	245 (59)	185 (61)	60 (54)	0.20
Reason for admission				
Acute intoxication	33 (8)	31 (10)	2 (2)	0.01
Alcohol withdrawal	62 (15)	53 (18)	9 (8)	0.02
Traumatic injury	77 (19)	68 (22)	9 (8)	0.01
Sepsis/infection	41 (10)	24 (8)	17 (15)	0.03
Suicide/overdose	36 (9)	33 (11)	3 (3)	0.01
Complication during admission	283 (68)	204 (67)	79 (71)	0.46
Readmission for alcohol/liver issue within 6 months	207 (50)	144 (48)	63 (57)	0.08
1-Year mortality	62 (15)	36 (12)	26 (23)	0.01

Values are presented as number (%) unless otherwise indicated.
a) Median (range); b) Median (interquartile range).

the median cost per day was approximately $5,000 [34]. In addition to the resource utilization during the index admission, almost half of the patients in our study's cohort were readmitted due to alcohol related issues in the 6 months after discharge. This number is likely an underestimate of the true rate of readmission, as patients may have presented to an outlying hospital whose data would not be available to this study.

Theoretically, most, if not all ICU admissions associated with AUD described in this study are preventable. If patients can decrease or cease alcohol use, overall population health could be significantly improved, and hospital costs could be decreased. In our study, we found that provider-led CD counseling and treatment discussions were associated with significant reductions in the rates of readmission and subsequent mortality. Using these high-risk situations as opportunities for employing motivational interviewing techniques to assist patients with changing their alcohol use, and hopefully setting up treatment options, has been described by other groups [8,38,39]. Importantly, in the present study, we found that even when patients did not voice acceptance of treatment support or a willingness to change, the CD counseling received was still associated with a decrease in 1-year mortality and a nonsignificant trend

toward lower readmission rates. We feel that every opportunity for motivational change and active discussion with patients is important as even if they are not willing to change at the time of initial discussion, it may lay important groundwork for subsequent opportunities. Clark et al. [40] found that for patient with unhealthy alcohol use admitted to the ICU, the severity of acute illness was significantly associated with a readiness to change. Providers need to continue to support patients and advocate for healthy behavior modifications.

We found that there are opportunities for improving the rates of CD counseling offered by providers, possibly indicative of provider biases that led them to not provide counseling where it may have been valuable for patients. For example, older patients were less likely to have CD counseling during their stay. It is possible that providers felt that alcohol use in older patients is more deeply embedded and less likely to be amendable to habit change; however, this is a missed opportunity for intervention. In addition, patients admitted for treatment of sepsis or infection were less likely to have alcohol CD counseling. Patients admitted with alcohol intoxication, overdose, or withdrawal had high rates of CD counseling documented, including rates that were higher than in patients with AUD who did not have an AUD diagnosis directly attached to the admission etiology. This highlights the need for greater provider awareness and use of alcohol use and abuse screening for patients without alcohol-related admission diagnoses. In addition, active and standardized approaches to inpatient alcohol screening and counseling have been associated with improved rates of identifying patients at risk and improving outcomes [6,7]. This may be evidenced in our high rate of alcohol CD counseling in our trauma patients, where screening and brief interventions have been standardized and have high rates of use [41], particularly compared to other hospital admitting services. Currently, other ICU services do not have standard protocol for who should receive CD counselling, it is left to provider discretion. While the present study did not identify significant race or gender disparities, other studies have noted disparities in access to substance abuse treatment and screening based on race and gender, and providers should be cognizant of possible implicit biases [42]. Standardization of alcohol use screening and CD counseling across all care groups may help decrease these disparities.

Access to treatment for alcohol disorders remains an issue in the United States. In a 2020 national survey, numerous barriers to receiving treatment were identified [1]. The most common reason, reported by 19% of patients, was a lack of health care coverage and not being able to afford treatment [1]. Stigma regarding alcohol abuse may also be an ongoing hinderance to receiving alcohol use treatment when needed, with 12% reporting that they felt that receiving treatment for their alcohol issues would cause their neighbors or community members to have a negative opinion about them [1]. Medical providers discussing alcohol abuse and its consequences may help patients feel supported in requesting treatment and decrease stigma, assisting patients and families with viewing AUDs as treatable medical conditions, not individual failings or weaknesses.

We added to the literature on the high risks associated with alcohol abuse and critical illness through our focus in this study on a mainly rural population, as well as by limiting the retrospective review to those patients receiving ICU care for organ dysfunction. By removing patients who were only monitored in the ICU, we described those patients with critical illness associated with alcohol abuse and AUD. The study is limited by its single center design, as well as the use of retrospective data. Due to the limitations of the available data, we did not use an alcohol use screening tool to identify and quantify the severity of alcohol abuse and instead used diagnoses entered into the medical record to identify our cohort, which may have missed patients who qualified. We were also unable to grade alcohol abuse based on amount of alcohol used by patient report. In addition, mortality may have been higher, as our access to mortality data for the study cohort was limited to mortality data available in the medical record.

ICU patients with alcohol abuse and AUD continue to have high rates of in-hospital mortality, as well as ongoing risk of death in the year following index admission. These patients accounted for high ICU and hospital resource use and had high rates of readmissions. Provider-led CD counseling can be associated with significant improvements in patient outcomes, and ongoing efforts to increase rates of in-hospital alcohol use screening and interventions to provide treatment options are imperative.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

FUNDING

None.

ACKNOWLEDGMENTS

None.

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