

Inpatient Alcohol Cessation Counseling Is Associated With a Lower 30-Day Hospital Readmission in Acute Alcoholic Pancreatitis

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Background: Alcohol use is a common cause of recurrent acute pancreatitis. Thus, guidelines recommend providing alcohol prevention resources during hospitalization. There is limited data on the real-world implementation of this recommendation. We aimed to assess how often inpatients admitted with alcohol-induced acute pancreatitis (AAP) receive counseling and to determine the impact of counseling on readmissions for AAP.

Methods: We retrospectively studied patients admitted with AAP at a tertiary care center from 2008 to 2018. We compared demographics, clinical features, and outcomes in patients who did and did not receive counseling. Outcomes studied were the proportion of patients with AAP receiving counseling, and readmission rates for AAP at 30 days and 1 year.

Results: A total of 243 patients with AAP were identified, of which 115 had inpatient alcohol counseling (47%). Demographic data were comparable between the 2 groups. Fewer patients receiving alcohol counseling were readmitted at 30 days compared with patients not receiving counseling (19.3% vs. 31.2%, $P=0.048$). At 1 year, the 2 groups had similar readmission rates. On multivariate analysis, patients who received counseling were half as likely to be readmitted in 30 days compared with those who did not receive counseling [odds ratio = 0.52 (0.27, 0.98), $P=0.046$].

Conclusions: We note that <50% of patients receive alcohol counseling. Patients receiving alcohol counseling were less likely to be readmitted at 30 days, inferring possible value in the intervention provided. Similar readmission rates at 1 year suggest that the single intervention may not have a durable effect on alcohol prevention.

Key Words: alcohol, acute pancreatitis, counseling, readmission
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Excessive alcohol use is one of the most common causes of acute pancreatitis (AP) and chronic pancreatitis. It is estimated that about half of patients hospitalized for acute

alcoholic pancreatitis (AAP) will have at least 1 recurrent episode of pancreatitis, and many of these patients progress to chronic pancreatitis.¹ Data from multiple cohort studies estimate that 20% to 50% of patients with an initial presentation of AP have recurrent episodes of acute pancreatitis (RAP).^{2–4} Of those with RAP, 42% to 80% will progress to chronic pancreatitis.^{3–5} Risk factors for progression from AP to chronic pancreatitis include smoking, ongoing alcohol consumption, and pancreatic necrosis.^{2,6}

Sustained abstinence from alcohol consumption may be difficult for patients to achieve, especially in patients with AAP. Several studies demonstrate that brief alcohol interventions are effective in the outpatient primary care setting as well as emergency departments in reducing harmful alcohol consumption, however, disease-related outcomes have not been reported. Systematic reviews and meta-analyses analyzing the benefits of brief alcohol interventions in primary health care settings found that these were effective at addressing harmful drinking.⁷ A more recent Cochrane review reiterated the efficacy of these interventions in reducing weekly alcohol consumption.⁸ Major society guidelines, including the International Association of Pancreatology/American Pancreatic Association (IAP/APA), American College of Gastroenterology (ACG), and Japanese Guidelines for pancreatitis, do not include a recommendation about alcohol cessation counseling.^{9–11} However, the recent American Gastroenterological Association (AGA) guidelines and a study to identify quality indicators for AP by Ketwaroo and colleagues recommends alcohol cessation counseling for those hospitalized with AP, although the manner in which counseling should be carried out is not specified.^{12,13}

Nikkola and colleagues followed a cohort of 118 patients with an initial presentation for AAP, all of whom received an intervention against alcohol consumption before discharge. Only 18 (7%) patients remained abstinent for a mean follow-up time of 5 years, during which, none had a recurrence of AP. In contrast, 34% of the nonabstinent patients had RAP within 2 years of follow-up.¹⁴

In another study, Nordback and colleagues conducted a randomized controlled trial in 120 patients received inpatient alcohol counseling for the first episode of AAP, and subsequently, patients were randomized to outpatient alcohol cessation counseling at 6 monthly intervals or no outpatient counseling. In the intervention group, 8% had recurrence of AAP compared with 21% in the control group who received only inpatient counseling.¹⁵

Although there is evidence that ongoing outpatient counseling reduces recurrent AAP after the first episode,

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there is no data on the effect of a single inpatient intervention after either the initial or RAP. Moreover, in a real-world setting, not all patients with AAP receive counseling during their hospitalization. Therefore, we sought to evaluate the effectiveness and outcome of inpatient alcohol cessation counseling for all AAP patients in preventing recurrent admission for AAP when compared with patients who do not receive counseling.

METHODS

Data Source, Patient Selection, and Study Design

We performed a retrospective review of patients with a discharge diagnosis of AP admitted to our tertiary care hospital between January 1, 2008, and December 31, 2018. The revised Atlanta criteria were used for making a diagnosis of AP, which included patients who met at least 2 of the following 3 criteria: characteristic epigastric pain, the elevation of serum lipase level to 3 times upper limit of normal, and evidence of pancreatitis on cross-sectional imaging such as computed tomography or magnetic resonance imaging.¹⁶ The diagnosis of AP was verified by the authors during the medical record review. Of all patients with AP, only those with AAP were then included to comprise our final study population. Patients under the age of 18 years and those with chronic pancreatitis were excluded from the study. Patients with pancreatitis from causes other than alcohol and those with a recent history of pancreatic surgery or that of known malignancy of the pancreaticobiliary tract were also excluded. After excluding these patients, our final study population comprised of all adult patients hospitalized with AAP.

Several data parameters including demographic, clinical, laboratory, and radiologic characteristics of the study population were collected. By definition, all patients in the study were actively drinking alcohol at the time of admission. Lifetime history of tobacco smoking included all patients who were former (quit 6 mo earlier) and current cigarette smokers. The severity of AP in each patient was defined based on the Bedside Index for Severity of Acute Pancreatitis (BISAP) score.^{17,18} Patients were classified as mild (AP without any local or systemic complications), moderate [AP with local complications with or without transient (<48 h) end-organ failure], and severe [AP with local complications with or without persistent (>48 h) end-organ damage] based on revised Atlanta criteria.¹⁶ Local complications included pancreatic necrosis, pancreatic fluid collection, and pancreatic abscess. Hospital outcomes including length of stay (LOS), complications, 30-day, and 1-year readmission, and mortality data were collected on all patients.

Study Groups and Outcomes of Interest

We divided our cohort of all patients with AAP into 2 groups: those who received inpatient alcohol-related counseling (counseling group) and those who did not receive inpatient alcohol-related counseling (noncounseling group). Alcohol cessation counseling was ordered at the discretion of the treating medical team. A patient was defined as having received counseling if they were evaluated and counseled by a social worker and other members of a multidisciplinary addiction psychiatry team per departmental protocol while they were admitted to the hospital with AAP. This protocol has remain unchanged for the past 15 years. We then compared demographic characteristics, severity,

local complications, laboratory and radiologic parameters, and outcomes between the 2 groups. Our outcomes of interest were 30-day and 1-year readmission rates in the 2 groups. We also compared the demographics, clinical parameters, and outcomes in patients readmitted within 30 days and those who were not readmitted to identify any factors that may have contributed to readmission, in addition to inpatient alcohol counseling.

Approval was obtained from our institutional review board (IRB) for performing this study.

Statistical Analysis

All data analysis was performed using the R software (version 3.6.1; R Core Team 2018a) within RStudio (version 1.1463; RStudio Inc.) via the Tidyverse package.¹⁹ Continuous variables were presented as means with range and SD. These were analyzed using the *t* test or Wilcoxon rank-sum test as deemed appropriate. Categorical variables were presented as frequencies (%) and analyzed using the Pearson χ^2 test. Univariable analyses comparing several characteristics and outcomes between the 2 groups were performed. We performed a multivariable analysis, using a logistic regression model, after adjusting for demographic characteristics, comorbidities, severity, and complications of AP to assess the presence of alcohol-related counseling as an independent predictor of significant outcomes.

TABLE 1. Demographics and Clinical Characteristics of Patients With Alcohol-induced Acute Pancreatitis Who Did and Did Not Receive Alcohol Cessation Counseling

Demographics and Severity	n (%)		P
	No Counseling (N = 128)	Counseling (N = 115)	
Demographics and comorbidities			
Age [median (IQR)]	47.4 (37.9; 55.8)	44.6 (36.7; 53.0)	0.171
BMI [median (IQR)]	24.1 (22.0; 27.4)	24.6 (22.1; 28.9)	0.559
Gender			0.349
Female	30 (23.4)	34 (29.6)	
Male	98 (76.6)	81 (70.4)	
Race			0.056
White	86 (68.3)	71 (61.7)	
Black	32 (25.4)	42 (36.5)	
Other	8 (6.35)	2 (1.74)	
Lifetime history of smoking	84 (65.6)	79 (68.7)	0.710
Current/active smoking	66 (51.6)	54 (47.0)	0.556
Prior history of pancreatitis	84 (65.6)	62 (53.9)	0.084
Severity and complications			
BISAP			0.771
0	69 (56.6)	69 (60.0)	
1-2	49 (40.2)	41 (35.7)	
≥ 3	4 (3.28)	5 (4.35)	
Modified Atlanta criteria			0.771
Mild	69 (56.6)	69 (60.0)	
Moderate	49 (40.2)	41 (35.7)	
Severe	4 (3.28)	5 (4.35)	

BISAP indicates Bedside Index for Severity of Acute Pancreatitis; BMI, body mass index; IQR, interquartile range.

RESULTS

A total of 243 patients with AAP were identified, of which 115 had alcohol cessation counseling (47%). The 2 groups were similar in age, sex, ethnicity, alcohol and tobacco use, the severity of pancreatitis, associated comorbidities, and previous episodes of AAP (Table 1). In both groups, the majority of patients had mild AAP and had a prior history of pancreatitis before the study hospitalization. When comparing patients with the first hospitalization for AAP versus recurrent AAP, there was no difference in the proportion of patients receiving alcohol counseling [53/97 (54.6%) first AAP vs. 62/146 (42.5%), $P=0.084$].

Outcomes are outlined in Table 2. Patients who received counseling had a longer LOS (4.61 vs. 2.0 d, $P<0.01$). The counseling group had a higher proportion of patients with *Clostridium difficile* infections and gastrointestinal bleeding. A significantly higher proportion of the group without counseling were discharged on opioids (55.9% vs. 33%, $P<0.01$). The mortality and frequency of inpatient alcohol withdrawal, delirium, and other complications were similar in both groups.

A significantly smaller proportion of patients receiving alcohol counseling were readmitted at 30 days compared to those patients not receiving counseling (19.3% vs. 31.2%, $P=0.048$, Table 2). At 1 year, both 2 groups had similar proportions of patients readmitted.

We also analyzed patients who had 30-day readmission for AAP ($n=62$) and compared them to those who did not have 30-day readmissions ($n=181$) to assess if there were any additional factors that contributed to readmissions in addition to alcohol counseling (Table 3). In the group of patients that were readmitted within 30 days, there was a higher proportion of active smokers and patients with recurrent AAP. A higher

proportion of patients without 30-day readmissions received alcohol counseling (35.5% vs. 51.4%, $P=0.044$) during the study hospitalization. Also, a significantly higher proportion of patients admitted within 30 days were readmitted within 1 year (95.2% vs. 54.1%, $P<0.001$).

In a multivariate logistic regression analysis (Table 4), patients who received counseling were half as likely to be readmitted in 30 days compared with those who did not receive counseling [odds ratio = 0.52 (0.27, 0.98), $P=0.046$] after adjusting for age, race, current or active tobacco use, and prior history of pancreatitis.

DISCUSSION

In our study, we note that <50% of patients received alcohol counseling. However, when patients received counseling, a significantly lower proportion of patients were readmitted with AAP within 30 days compared with those who did not receive inpatient counseling. This suggests a protective association of inpatient counseling. The lower readmission frequency with counseling was still observed after a multivariate regression analysis, controlling for confounding variables such as active smoking, recurrent AAP, and severity of AAP, suggesting a beneficial impact of inpatient alcohol cessation counseling. However, at 1 year, a similar proportion of patients were readmitted suggesting that the single intervention may not have a durable effect on alcohol prevention. We also note that 30-day readmission was a significant risk factor for 1-year readmission; with almost all patients with 30-day readmission for AAP readmitted in 1 year.

Addiction psychiatry is a multidisciplinary team composed of physicians, nurses, and social workers who meet with hospitalized patients and provide brief inpatient

TABLE 2. Outcomes and Complications Among Patients With Alcohol-induced Acute Pancreatitis Who Did and Did Not Receive Alcohol Cessation Counseling

Outcomes	n (%)		P
	No Counseling (N = 128)	Yes Counseling (N = 115)	
LOS [median (IQR)] (d)	3.00 (2.00; 4.12)	4.61 (3.00; 6.38)	<0.001
No. NPO [median (IQR)]	2.00 (1.00; 3.00)	2.00 (1.00; 3.00)	0.233
Readmitted within 30 d	40 (31.2)	22 (19.3)	0.048
Readmitted within 1 y	83 (64.8)	74 (64.3)	1.000
Inpatient mortality	0 (0.00)	1 (0.87)	0.473
Discharged on opioids	71 (55.9)	38 (33.0)	0.001
No. CTs	66 (51.6)	56 (48.7)	0.751
No. MRIs	12 (9.38)	21 (18.3)	0.067
No. ERCPs	6 (4.69)	4 (3.48)	0.752
No. patients with alcohol withdrawal	18 (14.1)	28 (24.3)	0.060
No. patients on withdrawal protocol	48 (41.7)	56 (48.7)	0.354
Complications			
Renal failure	4 (3.12)	11 (9.57)	0.069
Intubation	2 (1.56)	5 (4.35)	0.260
Required dialysis	0 (0.00)	2 (1.74)	0.223
Bacteremia/sepsis	2 (1.56)	6 (5.22)	0.154
Pneumonia	0 (0.00)	3 (2.61)	0.105
Urinary tract infection	0 (0.00)	2 (1.74)	0.223
<i>Clostridium difficile</i> infection	0 (0.00)	6 (5.22)	0.010
GI bleeding	2 (1.56)	9 (7.83)	0.042
Altered mental status	0 (0.00)	1 (0.87)	0.477
Delirium	2 (1.56)	4 (3.48)	0.426

Bold indicates statistical significance P -values.

CT indicates computed tomography; ERCP, endoscopic retrograde cholangiopancreatography; GI, gastrointestinal; IQR, interquartile range; LOS, length of stay; MRI, magnetic resonance imaging; NPO, nil per os.

TABLE 3. Demographics and Clinical Characteristics Among Patients With Alcohol-induced Acute Pancreatitis Who Did and Did Not Have 30-Day Readmissions

Demographics and Severity	n (%)		P
	No 30-Day Readmission (N = 181)	Readmission Within 30 Days (N = 62)	
Demographics and severity			
Gender			0.345
Female	51 (28.2)	13 (21.0)	
Male	130 (71.8)	49 (79.0)	
Race			0.023
Black	60 (33.5)	14 (22.6)	
Other	10 (5.59)	0 (0.00)	
White	109 (60.9)	48 (77.4)	
Age [median (IQR)] (y)	46.6 (40.0; 55.0)	43.5 (36.7; 52.9)	0.088
BMI [median (IQR)]	24.6 (22.0; 28.3)	24.1 (21.3; 28.5)	0.646
LOS [median (IQR)] (d)	4.00 (3.00; 6.00)	3.00 (2.00; 4.78)	0.001
Mortality	0 (0.00)	1 (1.61)	0.255
Active tobacco use	81 (44.8)	39 (62.9)	0.020
Prior history of pancreatitis	99 (54.7)	47 (75.8)	0.005
BISAP			0.743
0	102 (57.6)	36 (60.0)	
1-2	67 (37.9)	23 (38.3)	
≥ 3	8 (4.52)	1 (1.67)	
Modified Atlanta criteria			0.743
Mild	102 (57.6)	36 (60.0)	
Moderate	67 (37.9)	23 (38.3)	
Severe	8 (4.52)	1 (1.67)	
Discharged on opioids	77 (43.0)	31 (50.0)	0.421
Alcohol cessation counseling	93 (51.4)	22 (35.5)	0.044
Readmission within 1 y	98 (54.1)	59 (95.2)	< 0.001

Bold indicates statistical significance P-values. BISAP indicates Bedside Index for Severity of Acute Pancreatitis; BMI, body mass index; IQR, interquartile range; LOS, length of stay.

counseling sessions, as well as provide referrals to various rehabilitation programs. We have demonstrated that there appears to be a benefit in these brief interactions that take place inside the hospital, and yet they appear to have not been used a majority of the time for our patients. There may be many reasons for patients not receiving counseling, and we can speculate that time constraints, the availability of the

TABLE 4. Multivariate Regression Analysis: Effect of Alcohol Cessation Counseling on Readmission Within 30 Days

30-Day Readmission	OR (95% CI)	P
Alcohol cessation counseling	0.46 (0.24, 0.86)	0.016

Adjusted for adjusting for age, race, active tobacco use, severity, and prior history of pancreatitis. CI indicates confidence interval; OR, odds ratio.

addiction psychiatry team, and patient consent may play a role. Moreover, alcohol cessation counseling was ordered at the discretion of the primary team rather than a mandatory consult as part of a standardized pathway or protocol at our institution. There may be certain implicit biases on who may receive counseling which cannot be identified in a retrospective study. However, we did not find any significant differences in demographics, active alcohol, and smoking, comorbidities, and severity of AAP in patients who received counseling and those that did not. Patients who were counseled did have a longer LOS. We can speculate some of the reasons for this finding. Delay in discharge could perhaps be explained by the higher proportion of *C. difficile* infection and gastrointestinal bleeding in this group. Moreover, the process of obtaining an addiction psychiatry consult may itself have delayed discharge.

Previous studies related to alcohol interventions have largely focused on the primary care and outpatient settings, with primary outcomes of interest being weekly alcohol consumption. Nordback et al¹⁵ addressed outcomes related to AAP with respect to alcohol cessation counseling, although this was done as a randomized control trial studying the efficacy of longitudinal outpatient counseling after the first hospitalization for AAP. Moreover, all patients received alcohol cessation counseling before randomization and discharge. Such longitudinal outpatient alcohol counseling appears to be beneficial in preventing recurrent pancreatitis but can be labor-intensive and requires a significant time commitment from the patient and from clinicians, and may limit its effectiveness, that is, how the intervention performs under real-world conditions despite its efficacy in controlled trial settings. In our study, we are able to assess how counseling performs in a real-world setting and are able to compare outcomes in all hospitalized patients with both first and recurrent episode of AAP, who received counseling, and those who received no counseling. This type of brief intervention has been demonstrated to be effective in other settings, as shown by Gentilello et al,²⁰ where a brief motivational interview conducted by trained psychologists in patients who were hospitalized in the emergency department for alcohol-related traumatic injuries had a reduction in alcohol intake and risk of trauma recidivism even though they did not have follow-up outpatient counseling sessions.

While there was no continued outpatient counseling in our study, we note that only one third of the patients enrolled in the Nordback and colleagues' study completed the study, suggesting the difficulty in maintaining alcohol abstinence. Also, as shown by Nikkola and colleagues, despite providing regular interventions in the controlled study setting, only 7% of patients remained abstinent from alcohol use. As such, our study focuses on effectiveness (how an intervention performs in real-world conditions) rather than efficacy (how an intervention performs under optimal or ideal world conditions).¹⁴ Taken together, these data suggest that inpatient counseling may provide benefit in preventing pancreatitis short-term readmissions in a way that is sustainable.

In our study, we also note that active smokers were significantly more likely to be readmitted in 30 days compared with nonsmokers. It is well-established that smoking and alcohol use synergistically increase the risk of recurrent AAP. Even though our multivariate regression analysis controlled for smoking, smoking may still represent a confounding variable which affected readmission rates. At the same time, this finding could indicate that both alcohol and smoking cessation counseling may be beneficial in reducing the risk of recurrent AAP.

In univariate analysis, prior episodes of AP were also a risk factor for all 30-day readmissions, irrespective of counseling. This suggests counseling may be the most beneficial for patients who are hospitalized for their first episode of AP. Of note, our study did not demonstrate significant differences in the response to counseling among patients with more severe pancreatitis compared with those with mild pancreatitis, although this may be related to the fact that mild AP cases were prominently represented in our study population.

While Nordback et al¹⁵ also evaluated outcomes of alcohol cessation counseling, our study differs in multiple aspects, which also highlights the strengths of the study. In contrast to the European study, this is the first study in the United States, which has implications to the applicability of our study results. In addition, we were able to compare outcomes with a control group that did not receive any counseling as opposed to the European study where every patient received inpatient counseling before randomization, which highlights the effectiveness of inpatient counseling as an intervention. Most importantly, we address the impact of a single inpatient counseling intervention specifically on pancreatitis readmissions and have shown that there is a significant reduction in the incidence of short-term readmissions, irrespective of initial or RAP. We provide evidence that a single intervention in the inpatient setting is independently associated with reduced short-term hospital readmissions. This, in turn, may affect readmissions within 1 year as our data shows that patients who are readmitted within 30 days are more likely to be readmitted again within 1 year, irrespective of counseling. Our study is limited by design in that it is a retrospective cohort study that neither supports nor refutes a causal relationship between counseling and hospital readmission for pancreatitis. In addition, we are unable to determine the proportion of patients who followed up in the outpatient setting after being discharged from the hospital. It is possible that those patients who followed up in the clinic after discharge receive additional counseling that may have contributed towards decreased readmissions; however, the retrospective nature of our study limits us from having access to this information. The retrospective nature of our study prevents the identification of any implicit biases that may have resulted in not providing counseling for all patients. Also, it is possible that patients who received counseling did not all receive the same standardized counseling. Last, there are several social factors that play an important role in patients with alcohol use disorder, such as social support, employment, living situation, family, concurrent substance abuse, etc. Unfortunately, we did not have access to such information, another limitation of the retrospective nature of our study.

In summary, we found that inpatient alcohol cessation counseling was associated with a decrease in short-term 30-day readmissions for AAP, and those who were readmitted at 30 days were more likely to be readmitted for RAP in 1 year regardless of whether they received counseling. All of this suggests a protective mechanism of inpatient counseling against readmissions for AP. Further work should focus on identifying barriers to providing alcohol prevention resources to patients admitted with AAP.

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