The influence of episodic mood disorders on length of stay among patients admitted to private and non-profit hospitals with alcohol dependence syndrome

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Abstract

Episodic mood disorders are often associated with alcohol dependence. Few studies have explored the contribution of episodic mood disorders to length of stay among those hospitalized with alcohol dependence syndrome. Filling this research gap could improve care for patients while minimizing hospital utilization costs. This study was a cross-sectional analysis of the National Hospital Discharge Survey. ICD-9-CM diagnosis codes were used to identify those admitted to a private or non-profit hospital with alcohol dependence syndrome, and a co-morbid diagnosis of an episodic mood disorder (n=358). Descriptive statistics were used to highlight differences in key demographic and hospital variables between those with and without episodic mood disorders. Negative binomial regression was used to associate episodic mood disorders with hospital length of stay. Incidence rate ratios were calculated. Co-morbid episodic mood disorders (β=0.31, P=0.001), referral to a hospital by a physician (β=0.35, P=0.014), and increasing age (β=0.01, P=0.001) were associated with longer hospital stays. Hospital patients with an admitting diagnosis of alcohol dependence syndrome were 36% more likely to have a longer hospital stay if they also had a co-morbid diagnosis of an episodic mood disorder (IRR=1.36, CI=1.14-1.62). Patients admitted to a hospital with alcohol dependence syndrome should be routinely screened for episodic mood disorders. Opportunities exist for enhanced transitional care between acute, ambulatory, and community-based care settings to lower hospital utilization.

Introduction

Alcohol dependence has substantial consequences for individual and public health. According to the American Psychiatric Association,[1] alcohol dependence exists when individuals continue to engage in excessive alcohol consumption despite severe personal consequences such as damage to health, relationships, career, and many other aspects of daily life. Such excessive alcohol consumption can lead to several physical ailments such as stroke, heart disease, hypertension, and even brain damage.[2] Damage to internal organs such as the liver is also reported by those who practice excessive alcohol consumption.[3] In addition to physical ailments, alcohol dependence is linked to a multitude of psychiatric disorders such as major depression, mania, panic disorders, schizophrenia, and even suicide.[2] A sub-set of these psychiatric disorders is identified by the ICD-9-CM[4] as episodic mood disorders. These include bipolar I disorder, manic affective disorder, and major depressive affective disorder. For those diagnosed with both alcohol dependence and co-morbid psychiatric disorders, quality of life can be substantially diminished.[5] Alcohol dependence also has a serious effect on public health through the strain it places on the healthcare system and the risks associated with injuries. Alcohol related admissions represent 7.9% of all emergency department visits.[6] There is also a positive relationship between alcohol dependence and the likelihood of being admitted to an emergency department.[7] Some of this relationship could be due to the detrimental role alcohol plays in cases of both unintentional and intentional injury.[8] As a result of alcohol related healthcare utilization, healthcare costs of alcohol dependency were estimated at nearly $30 billion in 2007.[8]

Alcohol dependence and psychiatric disorders such as depression are often related.[9] The relationship between alcohol dependence and psychiatric disorders has been described as bidirectional.[10] It is often difficult to know whether the alcohol dependence arose from the psychiatric disorder, or vice versa. Flensborg-Madsen and colleagues[11] recently addressed this question as one of temporal ordering. They found alcohol dependence was more likely to precede psychiatric disorders. Despite the temporal order, Schatzberg[10] reminds us of the complicated nature of alcohol dependence and psychiatric disorders. It is often a set of relationships that are difficult to identify and require a delicate balance of intervention from the acute, ambulatory, and community-based care settings. Unfortunately, hospitals are often not prepared to address mood disorders in patients presenting with non-psychiatric symptoms.[12]

The purpose of this study is to examine the association of episodic mood disorders with length of stay among patients admitting to a private or non-profit hospital with a diagnosis of alcohol dependence syndrome. This study is important because little is known about what mediates the length of stay for these patients. Ding and colleagues[13] conducted one of the only studies in this area and found a positive relationship between psychiatric disorders and length of stay among a population of substance abuse and alcohol users. However, their study was based on a wider range of patients that included a myriad of alcohol users and substance abuse users, and a myriad of psychiatric disorders in addition to episodic mood disorders. Further, their study was conducted using 2003-2007 data, and did not report likelihood statistics such as incidence rate ratios. This study adds to the work of Ding and colleagues[13] by examining more recent data and by incorporating likelihood statistics for use by policymakers and practitioners. Further, as opposed to the work of Ding and colleagues, this study examines a very specific population of alcohol users and psychiatric disorders: alcohol dependence syndrome and episodic mood disorders respectively. The narrower focus of this study is meant to yield more actionable data for practitioners by discussing the results in the context of a common patient profile that might be seen in everyday clinical practice.

Materials and Methods

Instrument and design

The 2008 National Hospital Discharge Survey (NHDS) was used to design a cross-

sectional analysis. The NHDS is conducted annually by the Centers for Disease Control and Prevention.[14] The 2008 NHDS is a public use dataset that is available free of charge. As such, this study was exempt from review by the Texas A&M University Institutional Review Board.

Selection criteria

The 2008 NHDS contained 165,630 de-identified individual records. Records were selected for the sample if their medical abstract indicated the individual had been admitted to a hospital facility with a diagnosis of alcohol dependence syndrome. This was determined by including all records with an admitting diagnosis coded within ICD-9-CM Code 303. Further, records were excluded if the medical abstract indicated the patient was treated at a government-run hospital. This exclusion criterion was used to enhance the likelihood the sample members were representative of the broader community.

Dependent variable

The dependent variable in the analysis was length of hospital stay. This variable was obtained by examining line 10 of the 2008 NHDS, *days of care*. Since the variable was a count variable, it was substantially skewed in a positive direction. However, this problem was addressed with the choice of statistical method. Hence, the dependent variable was not transformed.

Independent variables

Given the research question and the desire to build on the work of Ding and colleagues,[13] several independent variables were incorporated from the 2008 NHDS. Age of the individual was measured as a continuous variable. Sex was included as a dichotomous variable. Race was included as a categorical variable indicating Non-Hispanic White, African-American, Other, or Not-Reported. Non-Hispanic White and African-American were also used in the regression analysis described below as independent dichotomous variables. Type of health insurance was included as a categorical variable indicating government-sponsored health insurance, private sector health insurance, or other health insurance. Government-sponsored health insurance and private sector health insurance were also used in the regression analysis described below as independent dichotomous variables. The source of hospital admission was included as a categorical variable indicating physician referral, emergency room admission, law enforcement admission, or other type of admission. Physician referral and emergency room referral were also used in the regression analysis described below as independent

dichotomous variables. Finally, episodic mood disorders were included as a dichotomous variable. This was determined by examining whether any of the seven co-morbid diagnoses captured on each record were coded within ICD-9-CM Code 296.

Descriptive statistics

Independent variables were dichotomized according to those records indicating both alcohol dependence syndrome and episodic mood disorders and those indicating only alcohol dependence syndrome. T-statistics were used to measure the difference in means between these two groups for continuous independent variables. Chi-square statistics were used to measure the difference in means between these two groups for categorical independent variables. The level of statistical significance was set at $\alpha=0.05$.

Negative binomial regression with incidence rate ratios

Negative binomial regression (NBR) was used to measure the association of the independent variables with the length of hospital stay. This analysis was completed in Stata version 11 (StataCorp LP, College Station, TX, USA).

In addition to conducting NBR, the analysis also included calculation of incidence rate ratios (IRRs). These ratios allow the reader to understand the magnitude of change in the dependent variable associated with a change in each independent variable in the analysis when holding the other independent variables constant. For example, an IRR of 2.0 for government-sponsored health insurance would indicate those in the sample with government-sponsored health insurance are twice as likely as their counterparts without such health insurance to stay longer in the hospital, all else being equal.

Results

Sample, descriptive statistics, and NBRmodel

The selection criteria resulted in a sample size of n=358. The sample was comprised of 98 individuals with a co-morbid diagnosis of an episodic mood disorder, and 260 individuals without a co-morbid diagnosis of an episodic mood disorder.

Table 1 reports the descriptive statistics of the sample. The mean age of the sample was 44.13±0.67. The sample was 70.7% male and 29.3% female. The majority of the sample did not report their race (51.4%). The sample was almost evenly split between those with govern-

ment-sponsored health insurance (36.9%) and those with private sector health insurance (38.3%). Among those without a co-morbid diagnosis of an episodic mood disorder, 39.2% were admitted to the hospital by a referring physician, 51.2% were admitted through the emergency department, 5.4% were admitted through law enforcement, and 4.2% through other sources. Among those with a co-morbid diagnosis of an episodic mood disorder, 26.5% were admitted to the hospital by a referring physician, 53.1% were admitted through the emergency department, 10.2% were admitted through law enforcement, and 10.2% through other sources. These differences were statistically significant ($\chi^2=22.99$, P=0.002). Finally, those without a co-morbid diagnosis of an episodic mood disorder were less likely to remain in the hospital (3.77±0.21) compared to those with a co-morbid diagnosis of an episodic mood disorder (5.00±0.57). This difference was statistically significant (t=2.54, P=0.012). Table 2 reports the results of the NBR with IRRs. Three variables exhibited a statistically significant association to length of hospital stay. Age was positively associated with longer hospital stays ($\beta=0.01$, P=0.001). However, the IRR was 1.01 representing only a 1% greater chance of a longer hospital stay with each year of increased age. Episodic mood disorders were positively associated with longer hospital stays ($\beta=0.31$, P=0.001). The IRR was 1.36 representing a 36% greater chance of those with a co-morbid diagnosis of an episodic mood disorder staying in the hospital longer than those without a co-morbid diagnosis of an episodic mood disorder. Finally, physician referral to a hospital was positively associated with a longer hospital stay ($\beta=0.35$, P=0.014). The IRR was 1.42 representing a 42% greater chance of those referred to a hospital by a physician staying longer than those not referred by a physician.

Discussion

Episodic mood disorders must be evaluated to reduce hospital utilization

The results of this study indicate a similar result to the work of Ding and colleagues;[13] episodic mood disorders are positively correlated to length of hospital stay among those with alcohol dependence. However, this study illustrates the magnitude of this likelihood, which should cause policymakers and practitioners to take note when attempting to reduce length of hospital stays and rates of utilization. The first step in addressing this issue is to review hospital admission procedures to assure patients arriving in the emergency

department are screened for episodic mood disorders. Instruments such as the Hospital Anxiety and Depression Scale (HADS) have shown themselves to be reliable and efficacious tools to identify those suffering from these conditions.[16] Early diagnosis of these conditions can enable initiation of treatment immediately upon presentation, possibly reducing time spent in the hospital. The second step in addressing episodic mood disorders and hospital length of stay is to address treatment in primary care. More than a third (35.8%) of the sample was referred to a hospital by a physician. It is noteworthy that patients with a co-morbid diagnosis of an episodic mood disorder were 42% more likely to stay longer in the hospital than those without a co-morbid diagnosis of an episodic mood disorder. This could indicate either an increased severity of alcohol dependence or episodic mood disorders, or a lack of resources to treat these conditions in primary care. This data highlights the importance of transitional care services in reducing length of hospital stay for this population. Based on these findings, it appears it is also important for physicians in primary care to screen for episodic mood disorders among their patients with alcohol dependence. In addition to more quickly identifying the co-morbid episodic mood disorders, earlier diagnosis also increases the likelihood of treating the disorder in non-hospital settings such as primary or community-based care. Finally, addressing re-admission risk is important in reducing hospital utilization. When treating psychiatric disorders among alcohol and illicit substance users, it is critical to monitor conditions after hospital discharge in order to ensure positive long-term outcomes.[17] This is most often accomplished through primary care or community-based care (e.g., community treatment programs). Without integrating care for this population across acute, ambulatory, and community-based care settings, future success in reducing

Table 1. Descriptive statistics: private & non-profit hospital admissions with admitting diagnosis of alcohol dependence syndrome and co-morbid conditions of episodic mood disorder (n = 358).

	No episodic mood disorder (N=260)	Episodic mood disorder (N=98)	Total (N= 358)	t	p
Age	44.19±(0.82)	43.96±(1.12)	44.13±(0.67)	0.16	0.877
Length of stay	3.77±(0.21)	5.00±(0.57)	4.11±(0.22)	-2.54	0.012
	No episodic mood disorder (N = 260)	**Episodic mood disorder (N = 98)**	**Total (N= 358)**		
Sex				3.57	0.059
Male	191 (73.5%)	62 (63.3%)	253 (70.7%)		
Female	69 (26.5%)	36 (36.7%)	105 (29.3%)		
Race				5.27	0.261
Non-Hispanic White	91 (35.0%)	43 (43.8%)	134 (37.4%)		
African-American	22 (8.5%)	4 (4.1%)	26 (7.3%)		
Other	10 (3.8%)	4 (4.1%)	14 (3.9%)		
Not reported	137 (52.7%)	47 (48.0%)	184 (51.4%)		
Health insurance type				9.24	0.416
Government-sponsored	95 (35.0%)	37 (37.8%)	132 (36.9%)		
Private sector	97 (8.5%)	40 (40.8%)	137 (38.3%)		
Other	68 (3.8%)	21 (21.4%)	89 (24.8%)		
Hospital admission source				22.99	0.002
Physician referral	102 (39.2%)	26 (26.5%)	128 (35.8%)		
Emergency room	133 (51.2%)	52 (53.1%)	185 (51.7%)		
Law enforcement	14 (5.4%)	10 (10.2%)	24 (6.7%)		
Other	11 (4.2%)	10 (10.2%)	21 (5.8%)		

Table 2. Negative binomial regression model with Incident rate ratios.

Dependent variable: length of stay
Model fit measures
Log likelihood = -840.38
LR $\chi^2(7)$=44.25
Prob > χ^2= 0.000

Independent variable/measurement	Coefficient	Standard error	P	Incidence Rate ratio	Incidence rate ratio 95% confidence interval Lower	Upper
Age (Continuous)	0.01	0.00	0.001	1.01	1.00	1.02
Sex (1 = Male. 2 = Female)	-0.03	0.09	0.736	0.97	0.82	1.16
Non-hispanic white (1 = Yes. 0 = No)	0.06	0.09	0.489	1.06	0.89	1.27
African-American (1 = Yes. 0 = No)	-0.14	0.16	0.402	0.87	0.63	1.20
Government-sponsored health insurance (1 = Yes. 0 = No)	0.14	0.11	0.218	1.15	0.92	1.42
Private sector health insurance (1 = Yes. 0 = No)	0.01	0.11	0.938	1.01	0.82	1.24
Episodic mood disorder (1 = Yes. 0 = No)	0.31	0.09	0.001	1.36	1.14	1.62
Physician referral to hospital admission (1 = Yes. 0 = No)	0.35	0.14	0.014	1.42	1.07	1.87
Emergency room referral to hospital admission (1 = Yes. 0 = No)	-0.05	0.13	0.729	0.95	0.74	1.24

length of hospital stays is questionable.

Limitations

This study contributes new knowledge to the literature in this topical area. However, it is not without limitations. First, this study did not have access to information on past medical history of the individuals in the sample. This knowledge would have been helpful in adjusting the sample for hospital admission risk. Second, this study did not have access to information indicating severity of disease. This information would have also allowed for additional hospital admission risk adjustment in the sample. Third, this study did not have access to insurance claims or hospital charge data. This data would have enabled a detailed analysis of hospital utilization costs in addition to length of stay. Finally; future studies should also include more information on the type of hospital (e.g., academic, trauma, community, etc.). This would provide more context to the environment in which the patient was treated and subsequently admitted to the hospital. Because of these limitations, the author can't rule out the possibility that unmeasured confounding variables also influenced the results presented in the study. As such, caution is warranted regarding generalizability of the results.

Conclusions

Reducing length of hospital stays for alcohol dependent patients is linked to management of existing co-morbid diagnoses of episodic mood disorders. Managing these psychiatric disorders involves a combination of awareness among medical staff, early screening for these conditions, and integration of care among the many settings of the healthcare system. The challenge of reducing length of hospital stays can't be met though hospital processes alone. Primary and community-based care has an important role to play in ensuring adequate care for this population while reducing costs through excess hospital utilization. Based on the initial findings of this study, the author recommends policymakers consider making better use of primary and community-based resources to reach these populations earlier in the course of disease progression. Further, it is recommended that medical staffs in both the ambulatory and acute care settings be given continued training on the identification of episodic mood disorder symptoms and the appropriate course of action when such patients are identified.

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