RESEARCH - PRACTICE RELATIONSHIPS

Associations of Mental, and Medical Illnesses With Against Medical Advice discharges: The National Hospital Discharge Survey, 1988–2006

Rima Tawk · Sally Freels · Ross Mullner

Abstract This study examined the association of mental and medical illnesses with the odds for leaving against medical advice (AMA) in a national sample of adult patients who left general hospitals between 1988 and 2006. Leaving AMA was first examined as a function of year and mental illness. Multiple logistic regression analysis was then used to adjust for patient and hospital characteristics when associating mental and major medical diagnoses with AMA discharges. The results indicated that leaving AMA was most strongly associated with mental health problems. However, the impact of mental illness was attenuated after adjusting for medical illnesses, patient and hospital characteristics. The strongest predictors of AMA discharge included being self-pay, having Medicaid insurance, being young and male, and the regional location of the hospital (Northeast). When substance abuse conditions were excluded from the mental illness discharge diagnoses, mental illness had lower odds for leaving AMA. The results may be of value to clinicians, and hospital administrators in helping to profile and target patients at risk for treatment-compliance problems. Prospective primary data collection that would include patient, physician, and hospital variables is recommended.

Keywords Treatment compliance · Mental Health · Substance abuse

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Introduction

Leaving AMA has been described as the ultimate in non-compliance with a treatment regimen representing zero consent to doctor's recommendations (Sharf et al. 2005). The problem of AMA discharge has been reported in the literature during the last three decades and still continues to be a prevalent and vexing problem for patients and their physicians (Alfandre 2009). Previous studies have examined AMA discharges for a variety of conditions, including pneumonia (Saitz et al. 1999), substance abuse (Armenian et al. 1999), HIV (Anis et al. 2002), cardiac dysfunction (Ochitill et al. 1985), asthma (Baptist et al. 2007), acute myocardial infarctions (AMI) (Fiscella et al. 2007), cirrhosis (Myers et al. 2009), and admission to a general medicine ward (Weingart et al. 1998).

AMA discharge has been linked to increased patient morbidity (Baptist et al. 2007; Fiscella et al. 2007; Hwang et al. 2003) and mortality (Baptist et al. 2007; Fiscella et al. 2007), risk for hospital readmission (Anis et al. 2002; Baptist et al. 2007; Fiscella et al. 2007; Hwang et al. 2003; Aliyu 2002), and high economic costs (Aliyu 2002). For instance, patients with asthma who were discharged AMA had almost a threetimes higher risk of readmission to the hospital within 30 days (Baptist et al. 2007). In addition, patients who were admitted for AMI and then signed out AMA had 60% higher risk of death than those who were discharged regularly (Fiscella et al. 2007). AMA

discharges can result in higher, unnecessary health care costs. Aliyu 2002 calculated the readmission cost due to an AMA discharge at 56% higher than expected from the initial hospitalization using 30-day readmission data. Most of the previous studies on AMA discharges have indicated that the predictors and rates of such a discharge vary by medical conditions, treatment settings, and patient populations (Armenian et al. 1999; Baptist et al. 2007).

Factors related to irregular discharges have been studied in numerous health care settings: psychiatric units, alcoholism programs, medical units and drug dependency settings. Much of the literature on predictors of AMA discharges has often produced inconsistent findings. However, the variables that have been identified as significantly related to AMA in almost all treatment settings include younger age (Saitz et al. 1999; Baptist et al. 2007; Weingart et al. 1998; Ibrahim et al. 2007), male sex (Saitz et al. 1999; Baptist et al. 2007; Weingart et al. 1998; Aliyu 2002; Ibrahim et al. 2007; Smith and Telles 1991), Medicaid or no insurance (Saitz et al. 1999; Baptist et al. 2007; Weingart et al. 1998; Aliyu 2002; Ibrahim et al. 2007; Smith and Telles 1991), and diagnosis (alcohol- or drug-related diagnosis or mental disorder) (Saitz et al. 1999; Anis et al. 2002; Ochitill et al. 1985; Aliyu 2002; Smith and Telles 1991; Chan et al. 2004). Although African American race has been associated with AMA discharge in retrospective studies (Saitz et al. 1999; Anis et al. 2002; Aliyu 2002; Weingart et al. 1998; Moy and Bartman 1996; Pages et al. 1998), the effect of race is neutralized when socioeconomic and hospital-related factors are accounted for (Baptist et al. 2007; Franks et al. 2006). For patients admitted to general hospitals, the lack of a primary care physician (Weingart et al. 1998; Jeremiah et al. 1995) as well as a prior AMA discharge (Jeremiah et al. 1995) were associated with a higher likelihood of signing out AMA. Personality disorders (Greenberg et al. 1994) as well as current or history of injection of drug use were significant predictors of dropout AMA among substance abusers (Armenian et al. 1999). Among HIV patients, receipt of social assistance payments (Anis et al. 2002; Chan et al. 2004) and lack of social support (Chan et al. 2004) were associated with AMA discharges.

The rate of AMA discharges has differed significantly between medical conditions. For medical admissions, rates of AMA discharges have typically been less than 4% (Smith and Telles 1991; Moy and Bartman 1996; Franks et al. 2006; Jeremiah et al. 1995). In contrast, for HIV patients, the AMA discharge rate has been documented to be 13% (Anis et al. 2002). The AMA discharge rate in psychiatric or substance abuse units is much higher than the typically reported rate for acute care hospitals and can range from 16% for psychiatric patients (Akhtar et al. 1981; Brook et al. 2006) to 23% for substance abusers (Armenian et al. 1999).

Existing findings regarding the role of mental illness in AMA discharges are limited by small sample sizes, single site studies, and inadequate adjustment for confounders, particularly hospital characteristics such as ownership and bed size (Pages et al. 1998). In addition, previous research has examined the effect of co-morbid mental disorders on AMA discharge among medical inpatients (Saitz et al. 1999; Fiscella et al. 2007; Aliyu 2002; Smith and Telles 1991). Previous AMA studies in general hospitals did not include national data during this study period (Ibrahim et al. 2007; Moy and Bartman 1996) and did not control for mental illness (Baptist et al. 2007; Ibrahim et al. 2007; Franks et al. 2006).

The purpose of this study is to provide some of the much-needed information to better understand the role of mental and medical illnesses in AMA discharges in general hospital settings.

Methodology

Discharge Survey Data

This study used data from 1988 to 2006 obtained from the National Hospital Discharge Survey (NHDS) conducted by the National Center for Health Statistics (NCHS). NCHS annually collects data from a sample of approximately 300,000 inpatient medical records from a national sample of about 500 nonfederal short-stay care hospitals. NHDS, described in detail elsewhere (Dennison and Pokras 2000), provides nationally representative estimates on the characteristics of patients, lengths of stays, diagnoses, and surgical and non-surgical procedures in general hospitals of different bed sizes, ownerships, and geographic regions of the US. The survey used a stratified multistage cluster sampling design. The unit of analysis is the hospital discharge. Sampling weights were incorporated to account for the unequal probabilities of selection, and over-sampling. Patient characteristics included age, gender, race, marital status, insurance status, and diagnosis. Race was categorized as Whites, Blacks, and other race. Other race included American Indian/Alaskan native, Asian, native Hawaiian/other Pacific Islander, other, and not stated. Marital status was coded as married, single, and other. Other included widow, divorced, separated, and not stated. The expected primary source of payment was categorized as private insurance, medicaid, medicare, self-pay, and other. Private insurance included Blue Cross/Blue Shield, health maintenance organizations (HMO)/or preferred provider organizations (PPO), and other private insurance. Other insurance included worker's compensation, other government payments, no charge, and other insurance. The reasons for hospitalization were classified into 17 broad

groups derived from the International Classification of Diseases, Ninth Revision, Clinical Modification codes. For example, the category mental illness included drug abuse, alcohol dependence, depression, and psychosis and comprised all discharges with codes ranging from 290 to 319. Substance abuse/dependence codes were 291 (Alcohol-induced mental disorders), 292 (Drug-induced mental disorders), 303 (Alcohol dependence syndrome), 304 (Drug dependence), and 305 (Nondependent abuse of drugs). Hospital characteristics included the following: ownership, region, and bed size. Ownership refers to not for profit, for profit, and government. Geographical location refers to regional distribution of hospitals and was coded according to the U.S. Census Bureau's classification as Northeast, Midwest, South, or West. The months of discharge were coded into 4 seasons: winter, spring, summer, and fall to determine whether there is a seasonal variation in AMA discharge. Patients aged less than 18 were excluded. Discharges resulting in patient death or discharges with missing patient age or diagnosis were excluded.

Statistical Analysis

Using data from all years 1988 through 2006, leaving AMA was first examined as a function of year and mental illness. The variable "year" was treated as a categorical variable by entering each year as a dummy variable into the model with the referent year = "1988". Multiple logistic regression analysis was then used to adjust for patient and hospital characteristics when associating mental and medical illnesses with AMA discharges. Analyses were performed using PROC SURVEYLOGISTIC in SAS Version 9.2 (SAS Institute Inc, Cary, NC). NHDS dataset includes up to seven diagnoses per discharge. Indicators of mental and medical illnesses were created for the seven diagnostic fields since there is no implied ordering in NHDS dataset among the seven diagnostic fields. All conditions were treated equally in the analysis. Major Medical illnesses included circulatory, digestive, respiratory, poisoning, endocrine, and infectious diseases. As a sensitivity analysis, discharges with substance abuse diagnoses were separated out from all records that had mental illness as discharge diagnoses.

Results

Characteristics of Hospital Stays

Table 1 shows the weighted results for patient and hospital characteristics for the AMA and Non-AMA (NAMA) groups. NAMA refers to those patients who left with medical approval. Compared with NAMA, patients who left AMA

were younger (18- to 44-year-old group signed out AMA most frequently), included a greater proportion of males (about 60% of AMA discharges), and more whites (about 58%). Regarding marital status, 26.6% of AMA were single. Patients covered by Medicaid constituted 26.2% of all AMA patients. 68.6% of patients discharged AMA left the hospital within 3 days of arrival, compared with 51.3% of the NAMA population. AMA discharges in the spring season (26.5%) were slightly higher than in the fall season (22.3%).

During the study period that covered 18 years of data, of the 4,499,760 hospital discharge records, a total of 46,261 were against medical advice representing [4,985,960/547,075,442] 0.9% of all discharges as weighted prevalence. AMA patients differ from the general patient population. Mental illness accounted for 34% of AMA discharges and was the most frequent category associated with such a discharge (Fig. 1). AMA discharges were concentrated in a few diagnostic categories: Circulatory System (14.8%), Digestive System (8.8%), Respiratory System (8.4%), and Injury and Poisoning (8.3%). Alcohol or drug related problems, and personality problems were the most common mental illness subcategories within AMA patients (Fig. 2).

Relationship Among Mental, and Medical Illnesses and AMA Discharges

Leaving AMA (dependent variable) was examined as a function of year and mental illness. Discharges with mental illnesses diagnoses had about fivetimes higher odds of leaving AMA than patients with no mental illness (OR = 4.928; 95% CI 4.759–5.104; $P < .0001$). However, when patients with substance abuse were excluded, the odds ratios of leaving AMA was attenuated (OR = 3.295, 95% CI 3.101–3.502; $P < 0.0001$). Multiple logistic regression analysis was then used to adjust for patient and hospital characteristics when associating mental and medical illnesses with AMA discharges. Table 2 presents the results obtained from multiple logistic regression analyses for the association of AMA discharges with mental, medical diagnoses, patient and hospital related variables. After controlling for patient, hospital related variables, and major medical diagnoses, patients with mental illness had three-times higher odds (AOR = 3.110) of leaving AMA compared to patients with no mental illness. For major medical diagnoses, the odds for leaving AMA were most pronounced among patients with respiratory and infectious diseases (41 and 40%, respectively) as compared to patients with no respiratory and no infectious diseases in that order.

The odds of leaving AMA varied by age groups as compared to the oldest age category: the 65 years and older age group. The highest odds of leaving AMA was reported for the 37–44 age group (AOR = 4.608) while the 45–64

Table 1 Characteristics of hospital stays for NAMA and AMA during1988–2006

	NAMA		AMA	
	Weighted N[a] **547,075,442**	Weighted (%)	Weighted N[b] **4,985,960**	Weighted (%)
Age				
18–44	191,480,379	35.0	2,846,914	**57.1**
45–64	130,536,891	23.9	1,347,987	27.0
65+	225,058,172	**41.1**	791,059	15.9
Gender				
Male	210,225,685	38.4	2,945,710	**59.1**
Female	336,849,757	**61.6**	2,040,250	40.9
Race				
White	356,980,971	**65.3**	2,885,587	**57.9**
Black	62,173,921	11.4	1,022,087	20.5
Other	127,920,550	23.4	1,078,286	21.6
Marital status				
Married	177,274,304	32.4	933,284	18.7
Single	74,115,607	13.5	1,326,341	26.6
Other	295,685,531	**54.0**	2,726,335	**54.7**
Insurance				
Private	189,187,398	34.6	1,056,769	21.2
Medicaid	63,696,852	11.6	1,307,155	**26.2**
Medicare	228,616,405	**41.8**	1,242,864	24.9
Self-pay	25,932,632	4.7	820,715	16.5
Other	39,642,155	7.2	558,457	11.2
Number of beds				
100–199	135,207,706	**24.7**	1,335,815	**26.8**
200–299	104,620,051	19.1	894,575	17.9
300–499	130,920,025	23.9	1,232,706	24.7
500+	62,104,678	11.4	577,598	11.6
Ownership				
Proprietary	62,336,381	11.4	576,061	11.6
Government	68,262,283	12.5	812,268	16.3
Not-for-profit	416,476,778	**76.1**	3,597,631	**72.1**
Length of stay				
1–3 days	280,883,001	**51.3**	3,420,714	**68.6**
4–6 days	133,419,163	24.4	846,281	17.0
7+ days	132,773,278	24.3	718,965	14.4
Region				
Northeast	119,507,149	21.8	1,746,433	**35.0**
Midwest	127,911,708	23.4	960,910	19.3
South	204,548,095	**37.4**	1,481,557	29.7
West	95,108,490	17.4	797,060	16.0
Season				
Winter	144,228,146	**26.4**	1,237,490	24.8
Spring	142,656,353	26.1	1,320,920	**26.5**
Summer	133,835,921	24.5	1,316,905	26.4
Fall	126,355,022	23.1	1,110,645	22.3

Highest percentage in each category is highlighted in bold

[a] Total is estimated using sampling weights. Unweighted total is 4,453,499

[b] Total is estimated using sampling weights. Unweighted total is 46,261

Fig. 1 Comparing AMA to NAMA patients by diagnostic categories

Comparing AMA to NAMA by Diagnostic Categories

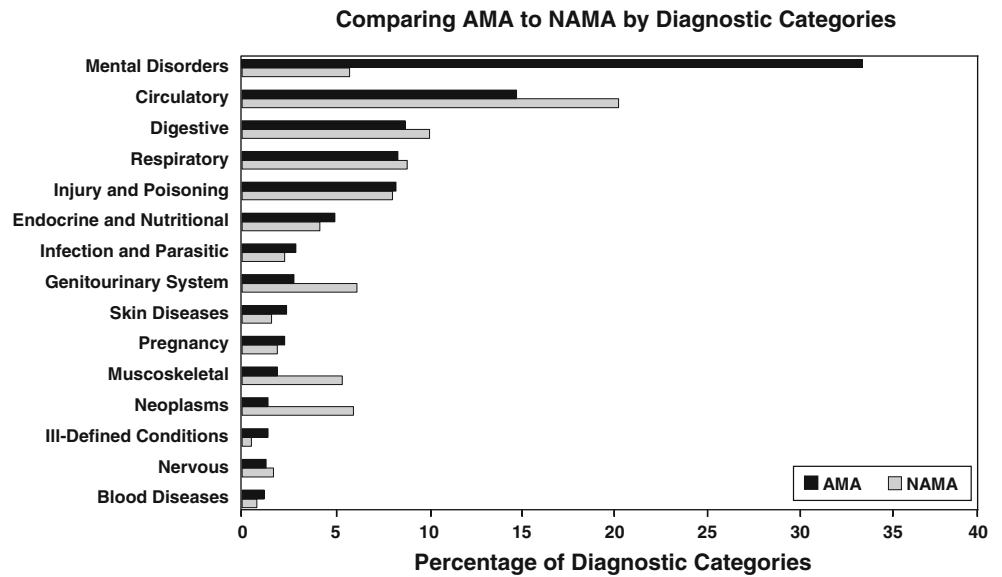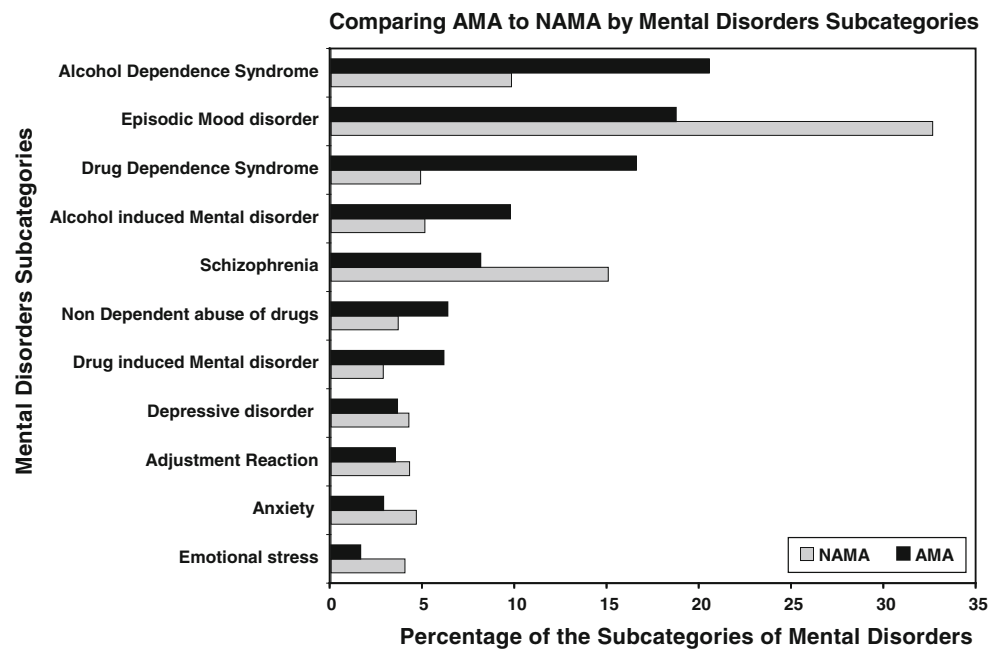**Fig. 2** Comparing AMA to NAMA by mental disorders subcategories

Comparing AMA to NAMA by Mental Disorders Subcategories

age group had the lowest odds of leaving AMA (AOR = 2.893). Males reported twice the odds of leaving AMA (2.148 fold, 95% CI 2.074–2.226) than females. Blacks had 32% higher odds of leaving AMA than whites (P < 0.0001). Single patients had 62% higher odds of leaving AMA than married patients. Compared with patients with private insurance, self-pay patients had the highest odds of leaving AMA (AOR = 3.952) followed by Medicaid insurance (AOR = 2.941), those covered by other insurance and Medicare. The number of beds category ranging from (6 to 99) was not significant (P = 0.2412) whereas all the other categories of the number of beds (100–199), (200–299), and (300–499) were

significant. Patients who were discharged from hospitals located in the Northeast had the highest odds of leaving AMA (AOR = 2.132) compared to patients discharged from southern hospitals. Patients discharged from proprietary or government hospitals had 37, 25% higher odds, respectively of leaving AMA than not for profit hospitals. Table 3 presents the results of the sensitivity analysis. When substance abuse conditions were excluded from the mental illness discharges, mental illnesses discharges had lower odds for leaving AMA (AOR = 2.792, 95% CI 2.601–2.998; P < 0.0001). The year-dummy terms were included in both adjusted and unadjusted analysis but the estimates were not shown in Tables 2 and 3.

Table 2 Logistic multiple regression models predicting AMA discharge including substance abuse

	Odds ratio	LCL	UCL	P value
Age				
18–24	3.018	2.774	3.284	<.0001
25–30	3.848	3.553	4.169	<.0001
31–36	4.506	4.178	4.861	<.0001
37–44	4.608	4.288	4.953	<.0001
45–64	2.893	2.710	3.088	<.0001
65+ years	**1.000**			
Gender				
Male	2.148	2.074	2.226	<.0001
Female	**1.000**			
Race				
White	**1.000**			
Black	1.320	1.265	1.377	<.0001
Other	0.948	0.909	0.989	0.0138
Marital status				
Married	**1.000**			
Single	1.621	1.528	1.719	<.0001
Other	1.480	1.410	1.554	<.0001
Insurance				
Private	**1.000**			
Medicaid	2.941	2.801	3.089	<.0001
Medicare	2.028	1.911	2.152	<.0001
Self pay	3.952	3.736		<.0001
Other	2.116	1.995 2.245	4.180	<.0001
# Beds				
6–99	0.966	0.913	1.023	**0.2412**
100–199	1.308	1.245	1.374	<.0001
200–299	1.155	1.095	1.218	<.0001
300–499	1.090	1.039	1.144	0.0005
500+	**1.000**			
Ownership				
Proprietary	1.377	1.298	1.462	<.0001
Government	1.246	1.188	1.307	<.0001
Not-for-profit	**1.000**			
Region				
Northeast	2.132	2.036	2.233	<.0001
Midwest	1.251	1.187	1.319	<.0001
South	**1.000**			
West	1.274	1.202	1.351	<.0001
Diagnosis				
Mental	3.110	2.977	3.249	<.0001
Circulatory	1.209	1.140	1.283	<.0001
Digestive	1.076	1.001	1.157	0.0473
Respiratory	1.414	1.304	1.534	<.0001
Poisoning	0.885	0.793	0.987	0.0286
Endocrine	1.188	1.115	1.266	<.0001
Infectious	1.399	1.270	1.540	<.0001

Bold values under the "Odds ratio" column indicate referent category for each variable and under "P value" column indicate <0.05 was considered statistically significant

Table 3 Logistic multiple regression models predicting AMA discharge excluding substance abuse disorders

	Odds ratio	LCL	UCL	P value
Age				
18–24	2.310	2.076	2.570	<.0001
25–30	2.610	2.352	2.896	<.0001
31–36	3.042	2.754	3.361	<.0001
37–44	3.218	2.936	3.527	<.0001
45–64	2.259	2.087	2.445	<.0001
65+ years	**1.000**			
Gender				
Male	1.938	1.851	2.028	<.0001
Female	**1.000**			
Race				
White	**1.000**			
Black	1.472	1.392	1.557	<.0001
Other	0.934	0.881	0.990	0.0207
Marital status				
Married	**1.000**			
Single	1.582	1.470	1.703	<.0001
Other	1.296	1.222	1.375	<.0001
Insurance				
Private	**1.000**			
Medicaid	3.013	2.811	3.229	<.0001
Medicare	2.046	1.888	2.216	<.0001
Self pay	4.243	3.927	4.584	<.0001
Other	2.258	2.090	2.439	<.0001
# Beds				
6–99	0.913	0.847	0.985	0.0189
100–199	1.292	1.212	1.377	<.0001
200–299	1.107	1.033	1.187	0.0040
300–499	1.024	0.963	1.089	0.4527
500+	**1.000**			
Ownership				
Proprietary	1.552	1.441	1.089	<.0001
Government	1.417	1.332	1.509	<.0001
Not-for-profit	**1.000**			
Region				
Northeast	2.132	2.006	2.266	<.0001
Midwest	1.246	1.162	1.335	<.0001
South	**1.000**			
West	1.280	1.188	1.379	<.0001
Diagnosis				
Mental	2.792	2.601	2.998	<.0001
Circulatory	1.283	1.197	1.374	<.0001
Digestive	1.083	0.990	1.186	0.0831
Respiratory	1.454	1.313	1.609	<.0001
Poisoning	0.869	0.757	0.999	0.0477
Endocrine	1.249	1.159	1.347	<.0001
Infectious	1.409	1.255	1.580	<.0001

Bold values under the "Odds ratio" column indicate referent category for each variable

Discussion

Our study is one of the first to examine the unadjusted and adjusted relationship between mental, medical illnesses and leaving AMA across the entire nation. We found the rate of AMA discharges to be 0.9%. The overall rate of discharge against medical advice in this study is consistent with previously reported rates (Saitz et al. 1999; Weingart et al. 1998; Ibrahim et al. 2007; Smith and Telles 1991; Moy and Bartman 1996; Jeremiah et al. 1995). The strongest relationship with respect to diagnoses was between mental illness and AMA discharge. This is consistent with the findings of other studies indicating a positive relationship between mental illness and the likelihood of leaving AMA (Saitz et al. 1999; Anis et al. 2002; Aliyu 2002). We noticed that the impact of mental illness was attenuated after adjusting for major medical diagnoses, patient and hospital characteristics.

By using a multivariate analysis to control for confounding, younger age, male sex, and insurance status (Medicaid or uninsured) were all independently associated with increased odds of AMA discharge. This is consistent with previous work on AMA patients (Saitz et al. 1999; Baptist et al. 2007; Weingart et al. 1998; Ibrahim et al. 2007). Age was the strongest predictor when substance abuse conditions were included. However, when substance abuse conditions were excluded, insurance (Self-pay) became the strongest predictor. Patients with less social support were at higher risk of leaving AMA. This is in agreement with another study (Chan et al. 2004). Our findings confirm previous results that alcohol or drug dependence and personality problems were the most common mental illness subcategories within AMA patients (Pages et al. 1998).

Our findings capture a regional difference (the Northeast region) in treatment dropout in general hospitals. This finding is unexplained by the available data. Previous research indicated that geographic variation in hospital use across the nation could be attributed to geographic difference in practice patterns and access to care (Watanabe-Galloway and Zhang 2007). Medium size hospitals (100–199; 200–299) had higher odds of AMA discharge than larger hospitals. This is consistent with a previous study (Ibrahim et al. 2007). Hospitals of small size (0.857) were protective against leaving AMA. Also, we found that for-profit hospitals had a slightly higher odds of AMA discharge than governmental hospitals. This is in agreement with another study (Franks et al. 2006) but the effect was more pronounced in the other study (Franks et al. 2006). While the analysis confirms the patterns found in the previous studies, it places the findings into a national perspective.

To our knowledge, our study is one of the largest studies (about 5 million inpatients included as total unweighted sample size) to examine AMA discharges and among the first few studies to robustly examine the association between AMA discharge and medical diagnoses, patient and hospital variables across the entire nation.

Data obtained from NHDS are cross-sectional and thus limit our ability to draw conclusions about causal factors. Our analyses may have been limited by the use of administrative data, which lack clinical detail compared with record review or interview studies. The data are based on discharges and not individuals therefore patients cannot be followed up to determine their readmission rate. Our study focuses exclusively on general hospitals. Data lacked information on income, education, employment, location (urban vs. rural), housing, and the reasons they were discharged AMA. A potential weakness of this type of data is that there are often co-occuring "episodic mood disorders" with substance abuse, so what is labeled the "principal diagnosis" is often somewhat arbitrary. The inability to determine the type of unit from which the patient left AMA is another limitation in NHDS data. We could not determine whether these psychiatric diagnoses were treated on psychiatric units of general hospitals or on medical floors due to the fact that NHDS data do not include any hospital identifiers.

The risk factors that were associated with treatment-compliance problems in this large, representative sample of U.S. inpatients may be of value to clinicians, and hospital administrators in helping to profile and target patients at risk for treatment-compliance problems. These findings may inform hospital administrators about the programs they should adopt to minimize AMA discharges. The use of a standardized protocol including patient's understanding of the diagnosis, treatment, alternative therapies, consequences of refusing treatment and the personal reasons that motivate them to leave AMA might be of benefit to patients, physicians and hospital managers (Lorenzi et al. 2000). Thus, one important criterion would be to assess patient decision-making capacity to ensure patient safety and autonomy are maintained and reinforced. This study conducted on a national sample of discharges could be helpful in the context of national policy. Knowing that factors such as insurance, hospital ownership, region, and hospital size could influence AMA discharges could be used as a point of departure for quality improvement efforts. Furthermore, awareness of the factors involved in AMA discharge could facilitate clinical decision making for high-risk patients and should guide and improve prevention programs designed to prevent or reduce the burden of AMA discharge.

Leaving AMA is associated with young mentally ill patients who are either self- insured or on Medicaid and discharged from hospitals located in the Northeast. The relationship between AMA and mental illness was more

clearly explained when medical diagnoses, patient and hospital factors were incorporated. Conclusions are often complex in AMA discharges because such events involve so many different variables. Early identification of patients at risk may decrease the occurrence of AMA discharge, and thus improve health outcomes, reduce downstream costs, and facilitate the continuity of care. Knowing the risk factors is essential to develop interventions for AMA patients. Among general patients, clinical factors, demographic characteristics as well as hospital factors appear to influence treatment compliance. This is in agreement with other studies that found that treatment-compliance problems are influenced by a variety of multidimensional factors (Perkins 2002; Compton et al. 2005).

Leaving a hospital AMA represents a significant problem in hospitalization settings and is an outcome of hospitalization that would best be avoided. Inpatient care is the most expensive component of mental health services and accounts for most mental health expenditures (Mechanic et al. 1998). Effective hospital utilization is therefore frequently conceptualized as the shortest length of stay necessary to manage symptoms and behaviors associated with mental illness (Leon et al. 2006). In-depth studies are needed to examine and explain the observed association between hospital characteristics and the patients' risk of self-discharge. Further research is still needed to identify factors behind such variations. Prospective primary data collection studies that include patient, physician, and hospital variables are needed to better understand why patients leave the hospital AMA and the clinical implications of their decision. Data on health care provider attitudes toward patients with a previous AMA discharge, and towards patients with substance abuse disorders should also be investigated.

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